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PRINCIPLES OF LOGIC.

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CUSACK'S

PRINCIPLES OF LOGIC,

PREPARED EXPRESSLY TO MEET THE REQUIREMENTS

OF THE

SYLLABUS FOR CERTIFICATE STUDENTS.

BY

S. BLOWS, M.A., B.Sc.

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GENERAL

"Grant that the phenomena of intelligence conform to laws; grant that the evolution of intelligence in a child also conforms to laws; and it follows inevitably that education cannot be rightly guided without a knowledge of those laws."

HERBERT SPENCER.

PREFACE TO THE FIRST EDITION.

THE present Text Book has been prepared specially for students preparing for the final examination for the Elementary School Teacher's Government Certificate. Such students will find in it material amply sufficient to answer any question likely to be set on "The Processes of Reasoning," as in drawing it up it has been thought advisable to err on the side of *too much*, rather than on the side of *too little*, for the purpose in view. The book is the outcome of considerable experience in preparing students for the "Certificate" Examination.

The arrangement of the first few chapters is due in the main to the valuable criticisms and suggestions of Professor CUSACK.

It is hoped that students other than those for whom it is specially prepared will find the book useful as a fairly complete introduction to the Study of Logic.

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GENERAL

PREFACE TO THE SECOND EDITION.

In preparing the Second Edition of this Text Book, it was thought advisable, in the light of greatly extended experience in teaching the subject, to entirely rewrite and greatly enlarge it. The present Edition may therefore be regarded as a new book. The First Edition has proved useful to thousands of students. The hope of the writer is that in its present form the book will prove more useful to even a greater number.

S. B.

September 1st, 1899.

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PRINCIPLES OF LOGIC.

CHAPTER I.

Reasoning.

There has never been a time in the history of the human race when knowledge has been regarded as a possession of greater importance than it is at the present day. It is true, that in education mental training is said to be the object aimed at rather than the mere acquisition of knowledge, yet when it is remembered that mental training is essentially a fashioning of the mind so as to make it capable of more readily acquiring knowledge than would be possible without such training, it becomes clear that in education directly or indirectly the acquisition of knowledge is the main, if not the sole, object. The possession of greater knowledge on the part of the human race has brought it about that to-day "millions find support where once there was food only for thousands", and that to the meanest of these millions comforts and pleasures are possible such as formerly were unattainable by the most powerful.

We all are ready to allow the transcendent importance of knowledge and, at the same time, are possibly inclined

to take pride in the thought that our knowledge is far greater than that of our fathers.

"We think our fathers fools, so little did they know,"

says Pope, and we are quite ready to agree with him; and yet how few of us stop to ask ourselves the question, "How has this increase of knowledge been brought about?" Granted the supreme importance of knowledge, the question "How is knowledge acquired?" is surely one that deserves to be answered. It is clear that we learn that honey is sweet by tasting it, that iron is hard by feeling it, that a buttercup is yellow by looking at it, and so on.

In these cases we gain knowledge by the use of our senses. The mind is seated in the brain and has communication with the outside world only by means of the senses. These senses are means of ingress to the mind; they are, as indeed they have been called, "the portals of knowledge". Could there be such a thing as a human being endowed with none of the senses, his mind (if we could say he had a mind) would inevitably be a perfect blank. Hence the immense importance in education of training the senses.

A little thought will, however, serve to make it clear that some of the knowledge that we possess has not been acquired directly through the use of our senses. Thus, the sun is known to be a globe many times larger than the earth, but our sense of sight alone would lead us to believe that it is a ball having a diameter of, at most, a few feet; and mere observation would tell us that the moon is as large as the sun. If we trusted to our senses alone, we should believe that the stars are mere points, that the sun moves daily in a curve from east to west, that the surface

of the earth is flat, and many other things which, with our present knowledge, we know to be false.

Further, it is evident that many facts known to be true could not from their very nature be known by the use of the senses alone. Thus we know that we are mortal, but no amount of observation alone could tell us this, for no one could be known to be mortal until he died; and hence no one could ever know that he himself was mortal. The mind, then, must possess some other means of acquiring knowledge. What is this means? An example will make it clear. A child sees a dog and learns by the actual use of his sense of sight that the dog has four legs. His sight tells him the same fact of several other dogs. From this he concludes that all dogs have four legs.

In this case the child makes use of the facts supplied by his sense of sight, and out of them he evolves an entirely new fact, viz., that all dogs have four legs. It is quite clear the child would never be able to learn this fact by observation alone, for he would never be able to see all dogs. He has gone through a process altogether different from that of observation, he has *reasoned*. That power possessed by the human mind of taking certain given facts and from them deducing new facts is called the *Reasoning Faculty;* the process by which such new facts are reached is called *Thinking* or *Reasoning*. To reason, then, is to obtain additional facts out of given facts. *Sensation* and *Reasoning* are the two, and the only two, means by which the mind can possibly obtain knowledge.

It is evident from what is said above that in order to reason we must first possess knowledge from which to reason. Reason cannot produce knowledge without having

raw material to work upon. This raw material is ultimately derived from sensation, and when used by Reason to establish new truths, it is called the *data** or *premisses*. The truth reached by reasoning is said to be *inferred* from the given premisses. The inferred truth or inference is often called the *conclusion*.

When a conclusion follows properly from its premisses, that is, in such a manner that, granted the truth of the premisses, the conclusion is necessarily true, it is said to be *valid*. The meaning of this word should be carefully noticed, as students frequently fall into the error of regarding any conclusion as valid if they know it is true. The distinction between the words *valid* and *true* will become clear on reading the examples of reasoning in Chapter II. At present it is sufficient to note that a valid conclusion may be a false one, if one or more of the premisses be false; and that on the other hand, a conclusion may happen to be true and yet not be valid if it does not follow properly from the premisses.

Everybody is continually making inferences or drawing conclusions from given data or premisses: and if the inferences so made were always valid there would be no need for any one to trouble further about the matter. Experience, however, teaches us that nothing is more common than for people to draw conclusions in no way justified by the premisses. Most people at times find their calculations mislead them, which would be impossible were such calculations made validly from true data. Hence it becomes necessary to consider under what conditions we may draw conclusions from given premisses; to find out whether there are general rules which must be observed in reasoning, and if so what

* *Data* is the plural of *datum*, a Latin word meaning *something given*.

such rules are. If such rules can be found, they may be called the *Laws* or *Principles* of Reasoning. A *law* or *principle* is the statement of a general truth.

That there are laws of reasoning is evident. No one doubts the truth of the statement that "things which are identical with the same thing are identical with each other". This is a law which no one hesitates to use as a principle of reasoning. Thus, if I am told that A is identical in height with B, and that C is identical in height with B, I immediately conclude that A and C are of identically the same height. The study of such principles of reasoning is conveniently referred to as the study of *Logic*, and *Logic* may be defined as the "Science of the Principles of Valid Reasoning". *Science* is general systematized knowledge about some subject matter, or the knowledge of those general laws which hold good in any department of nature. If Logic be regarded merely as a means to enable us to reason correctly it is then more accurately defined as the "Art of Valid Reasoning". Art is the skilful application of scientific knowledge.

In the next chapter we shall consider various examples of Reasoning.

Résumé of Chapter I.

1. All allow the importance of knowledge.
2. All knowledge is ultimately derived from the senses.
3. Much of our knowledge is directly due to the Reasoning Faculty which elaborates the elements supplied by the senses into more complex knowledge.
4. Truths used to establish other truths are called data or premisses.

5. A truth inferred from others is called a conclusion.
6. Reasoning is the process by which the human mind infers truth from other truths.
7. A Law is the statement of a general truth.
8. The "Principles of Reasoning" are the laws that must be observed in reasoning if our inferences are to be trustworthy.
9. These general principles are the subject matter of the Science of Logic.

Questions on Chapter I.

1. Why have the senses been called the "Portals of Knowledge"?
2. What is Reasoning?
3. By what possible means can the mind acquire knowledge?
4. Explain *data* or *premisses*, and *conclusion*.
5. Point out the premisses and conclusion in the following:—

   All planets go round the sun in elliptic orbits;
   Therefore the earth goes round the sun in an elliptic orbit, for the earth is a planet.
6. What is meant by the "Principles of Reasoning"?

CHAPTER II.

Examples of Reasoning.

The following examples should make the student more clearly understand what is meant by reasoning and, at the same time, enable him to distinguish the different kinds of reasoning treated of in this book.

I.

1. If we know that the statements—

All coins are useful things,

and This shilling is a coin,

are true, can we from these as premisses infer the truth of a third statement different from either of these? Clearly we can.

This shilling is a useful thing,

is such a statement, which is certainly true if the preceding premisses are true and which is therefore a conclusion inferred from those premisses. This conclusion is a truth quite different from either premiss, although, of course, it is contained in the two premisses together. Here we have, then, obtained a fresh truth from known truths, that is, we have reasoned. Moreover, the reasoning is valid, for, granted the premisses are true, the conclusion is also certainly true. The reasoning in this example seems so simple that the student may be inclined to ask how there

can be any difficulty in such a process as this. Let him have patience and he will soon discover that to reach a valid conclusion is often by no means an easy matter.

2. Next consider the premisses—

All fish live in water,
All herrings are fish.

From these we can by a process of reasoning make the inference that

All herrings live in water.

This is, as clearly as in the first example, a valid conclusion.

3. Again, let the premisses be—

All quadrupeds are herbivorous ;
All tigers are quadrupeds.

From these we may apparently infer that

All tigers are herbivorous,

a conclusion which is not true, for tigers are carnivorous.

When the student can apply the rules for testing arguments, to be enunciated hereafter, he will find that the above violates none of such rules, and is therefore valid. If a conclusion is not true there must be something wrong either with the premisses or with the reasoning. These are the only possible sources of the error. If either of the premisses be false the conclusion may also be false and yet be valid. If we examine the premisses in the above argument we easily see that one of them, viz.—

All quadrupeds are herbivorous,

is false. Here, then, is the explanation of the falsity of the conclusion. The fault is not in the reasoning, but in the information given as premisses, and, therefore, such fault is no concern of the mere logician ; he is concerned only with the reasoning, and that is valid.

4. Consider one example more—

All coins are useful things,
All shillings are useful things,
therefore,
All shillings are coins.

The student may at first think this conclusion as valid as any of the preceding ; a little further thought will, however, convince him that it is invalid. There are many useful things which are not coins, and it may be, so far as we can tell from the premisses, that all shillings are among these useful things which are not coins. If instead of—

All shillings are useful things,

we take as our second premiss—

All pens are useful things,

then by the same argument we have as conclusion—

All pens are coins,

which is manifestly untrue ; and as both premisses are true, it must be that something is wrong with the reasoning, and the conclusion is invalid. But if this is invalid so is the previous conclusion, "All shillings are coins," for it is drawn from similar premisses in identically the same way. In treating of the rules of the syllogism we shall again recur to these or similar examples. The fact that we may draw a conclusion which is really invalid, although true and apparently valid, shows the need of rules by which such arguments may be tested.

Two things should be noticed with regard to all the above examples of reasoning.

1. The conclusion is drawn from two premisses.
2. One premiss in each case is a more general statement than the conclusion.

Thus, in Example 4 one premiss is a statement about *all coins*, and is, therefore, more general than the conclusion,

which is a narrower statement made of *all shillings*. The student should pay special attention to these two characteristics of the above arguments, as they are the two distinguishing marks of all *deductive reasoning*.

II.

Now consider another type of reasoning—

1. We gradually find out by observation such facts as the following :—

An apple tends to fall to the ground,
An orange does the same,
A book does the same,
&c., &c.,

And ultimately we draw the conclusion that

All bodies tend to fall to the ground.

That this is an inference is clear, for we certainly have not proved it by experience in every case. It applies to all bodies in all places and at all times—even to the future.

Whether such an inference is valid or not, it is often a matter of great difficulty to decide. Some of the later chapters of this book will be devoted to this form of reasoning, but in an elementary book like this it will be impossible to treat of it fully. We are constantly drawing such conclusions, and frequently they are invalid.

2. Thus, we meet a foreigner and find him hasty; we meet another who is also hasty; and we become acquainted with another of a similar disposition, and we begin to think that

All foreigners are hasty.

Such conclusion is, however, by no means validly drawn from our premisses. Consider another case of an invalid

inference in reasoning of this form. A foreigner in learning English is told

that *tough* is pronounced *tuff*,
that *rough* is pronounced *ruff*, and
that *sough* is pronounced *suff*,

and he straightway calls *dough duff*, having inferred that *ough* always has the sound *uff*.

Two things should be noticed about the examples of reasoning in II.

1. The conclusion is drawn from an indefinite number of premisses.
2. The conclusion is more general than the premisses.

These are the characteristic features of *inductive reasoning*.

III.

We have seen that in deductive reasoning the conclusion is drawn from two premisses and in inductive reasoning from an indefinite number of premisses; now suppose we have but one premiss given, as for instance,

All birds are bipeds,

can we make any inference from this? Clearly we can, for if

All birds are bipeds,

It is evidently true that

1. Some birds are bipeds, and
2. Some bipeds are birds.

And some readers may at first think that

3. All bipeds are birds,

is also a valid inference from the given premiss. It is, however, invalid, as will be fully shown later on.

When conclusions are drawn from a single premiss, as in III., 1, 2, 3, the process is known as *Immediate Inference*. Reasoning, *deductive*, *inductive*, and *immediate* are the forms of reasoning treated of in this book.

Résumé of Chapter II.

I. In *deductive reasoning* the conclusion
   1. Is drawn from two premisses, and
   2. Is less general than the premisses.

II. In *inductive reasoning* the conclusion
   1. Is drawn from an indefinite number of premisses.
   2. Is more general than the premisses.

III. In *immediate inference* the conclusion is drawn from one premiss.

Exercises on Chapter II.

1. Give three examples of valid deductive inference.
2. Refer the following to whichever of the three types of reasoning it belongs:—

   All planets go round the sun in elliptic orbits,

   The earth goes round the sun in an elliptic orbit,

   Therefore the earth is a planet.
3. Is the argument in Question 2 a valid one?
4. Give two original examples of inductive reasoning.
5. When is reasoning said to be immediate?
6. What inferences can be made from—

   All owls are birds?

CHAPTER III.

The Uses of Logic.

From the examples given in Chapter II., it is clear that in certain cases there is great danger of drawing conclusions which are not justified by the given premisses. How can such invalid conclusions be avoided? Whatever will give a clearer understanding of the processes and fundamental principles of valid reasoning will evidently be of great service in preventing and in detecting invalid reasoning, But Logic is the science of the principles of reasoning, hence one great and apparent use of Logic is that it points out what mistakes are of frequent occurrence in reasoning, and how to avoid them. The student should, however, guard himself against expecting too much from a knowledge of Logic. It is quite possible to know all the rules of Logic and yet to reason badly, and on the other hand, it is true that many people reason well who have never studied reasoning as a science.

The practised logician owes his ability to detect error in reasoning not so much to the rules of Logic as he does to the critical frame of mind which has been developed in him by the process of acquiring a knowledge of those rules. He is not so ready to take statements and conclusions for granted as are those who lack such a course of training; he is apt to look upon them with suspicion, and consequently

he detects errors which are passed over by others from lack of careful observation. It is, then, the mental discipline involved in acquiring a knowledge of Logic, rather than the knowledge itself, which gives increased power of reasoning. This mental discipline is, perhaps, the greatest advantage to be derived from the study of Logic. Man is distinguished from animals chiefly by the possession of a mind. The more he cultivates his mind, the farther does he remove himself from the animal state.

The student who subjects himself to the discipline of a course of study in Logic will enlarge his reasoning power and will thus enable himself to make greater and more rapid progress in any branch of study.

The relation between Logic and the different branches of science is an intimate one, for every branch of science consists in collecting facts, or observing phenomena, and making inferences from them; and, as we have already seen, inference is the subject matter of Logic.

A science is for the most part the practical application of Logic to some subject matter. Thus Geology is Logic applied to the study of the earth; Biology is Logic applied to the study of life, and so on. It is worth noticing that *-logy*, which is the termination of the names of so many sciences, is derived from the Greek word *logos* (discourse), the adjectival form of which, *logikos*, gives us our word *Logic*. It is because no science can be studied without the application of Logic that this latter has been called the "Science of Sciences".

For teachers a knowledge of Logic is of special importance. It is characteristic of modern ideas to regard education as consisting in mental training rather than in the mere imparting of information. The phase of mind

which most directly concerns the teacher is the intellect, the highest activity of which is reasoning. Hence, the most important part of mental training is the training of the reasoning power. It is clear, then, that the more the teacher knows about the laws of reasoning the better will he be able to train children to reason. In the words of Herbert Spencer:—"Grant that the phenomena of intelligence conform to laws; grant that the evolution of intelligence in a child conforms to laws; and it follows inevitably that education cannot be rightly guided without a knowledge of these laws".

Nothing is more productive of faults in reasoning than a loose and inaccurate use of words. The student may readily enough allow this, but, at the same time, think the remark does not apply to him. The number of people who are never misled by a wrong use of words is a very small one indeed. Now, one of the most important parts of Logic is that relating to words and the ambiguities to which they are liable; and no earnest student can study this subject without becoming in consequence more careful to use words in their exact meanings, and such care must re-act on his pupils, causing them to use more correct language and consequently to reason more accurately. Moreover, this is not a mere unconscious re-action. The teacher who has had his eyes opened to the dangers that lurk in words will constantly endeavour to enable his classes to avoid such dangers.

Résumé of Chapter III.

THE USES OF LOGIC.

1. To avoid error in one's own reasoning.
2. To detect it in the reasoning of others.
3. As a means of mental discipline.
4. It is especially useful to teachers, for
   a. It tends to make them use words in their exact meanings, and train their pupils to do likewise.
   b. As being the Science of the Principles of Reasoning a knowledge of it gives teachers great help in developing the reasoning power in their pupils.

Exercises on Chapter III.

1. What is the greatest use to be derived from the study of Logic? Why?
2. Why should teachers especially have a knowledge of Logic?
3. Give the derivation of the word Logic.
4. Why has Logic been called the Science of Sciences?

CHAPTER IV.

The Parts of a Deductive Argument.

Before proceeding further it is advisable to examine more fully than was done in Chapter II. an example of deductive reasoning. Every such argument is a complex whole, consisting of certain essential elements. Before the validity of a deductive argument, then, can be tested, it is necessary to understand clearly what these essential elements are, so as to be able without hesitation to analyse the argument into its elements. Having found out what these elements are, it will be necessary to affix a name to each of them. Every art and every science has a language of its own, which it is essential that the learner should know, and Logic is no exception to this rule. It has its own technical terms, with which every student of the subject must make himself familiar. These technical terms are neither numerous nor difficult to learn. A few of them will be elucidated in this chapter.

As an example of the simplest form of the expression of a complete act of deductive thought, consider the argument—

All poets are philosophers,
Tennyson is a poet,
Therefore
Tennyson is a philosopher.

We have here three statements, or *propositions* in the language of Logic, which together form what is called a *syllogism*. This is the English form of the Greek word *syllogismos*, which means a *reckoning all together*. In Logic a syllogism may be regarded as the name applied to the expression of that form of mental activity in which three truths are brought together in one act of thought. A more technical definition will be given later on.

The syllogism is, then, a complex whole consisting of three propositions. Hence, to understand the syllogism the student must first clearly understand the nature of propositions. Now, in the above syllogism, the first two propositions are made use of to establish the truth of the third, and are therefore (as we have seen in Chapter I.), called the *premisses*.

The proposition—

Tennyson is a philosopher,

inferred from the other two, is called the *conclusion*.

The student should carefully notice that although the conclusion is, according to strict logical sequence, the third proposition of the syllogism, yet not infrequently it stands first, as for instance—

Brown is a man (conclusion)

For All heroes are men,
And Brown is a hero, } (premisses)

Sometimes the conclusion occupies the second place in the syllogism, as—

All heroes are men—(first premiss)
Therefore Brown is a man—(conclusion)
For Brown is a hero—(second premiss)

Now we will consider more closely one of the propositions of our typical syllogism. If we examine the proposition—

Tennyson is a poet

we see that it is a complex whole consisting of three elements, namely two names ("Tennyson" and "a poet") and a verb connecting them. The names are called *terms* and the verb which connects them, with or without a negative particle, is called the *copula*. The first term in a proposition when in logical form is called the *subject*, being the name of that which forms for the moment the subject matter of the mind's thought; the second term is the *predicate*, being the name of something predicated of, or asserted to belong to, the subject.

The student must carefully note the difference between the *logical* and the *grammatical* use of the word predicate. The grammatical predicate of the above proposition is—*is a poet;* but in Logic *is* is a copula and forms no part of the predicate. The copula, in every proposition which is expressed in strict logical form, is some part of the present tense of the verb to be.

The student will notice that although each proposition of the above syllogism contains two terms, yet there are but three terms altogether, as each occurs twice. This is the case in every valid syllogism.

From the above analysis it is clear that a knowledge of terms is necessary to the proper understanding of propositions, and a knowledge of propositions to the understanding of the syllogism. Hence, in text books of Logic, terms and propositions are treated of before the syllogism.

As in every syllogism there are three terms, two only of which are contained in the conclusion, there will always be one term which does not occur in the conclusion. This is called the *middle term.* In the syllogism considered above the three terms are *poets, philosophers, Tennyson;* of these *poets* does not occur in the conclusion and is therefore the

middle term. The other two terms have also appropriate technical names. The subject of the conclusion is called the *minor term*, and the predicate of the conclusion is the *major term*. The reason for calling these terms by these names will be made clear later on.

If, then, the symbols S, M, P stand for the minor, middle, and major terms respectively, the syllogism can be represented in the form—

All M's are P,
All S's are M,

Therefore

All S's are P.

The symbols S, M, and P are used as being the initials of *subject* (of conclusion), *middle term*, and *predicate* (of conclusion). This method of representing syllogisms is frequently of use in testing their validity.

Terms, propositions, and syllogisms are properly applied to the language in which thought is expressed, and not to thought itself. It is useful to note what mental operations correspond to these parts of the language of thought.

The process by which the mind gains simple ideas, or ideas of individual objects, is called *perception* ; and the process by which it gains general ideas, or ideas of classes, is known as *conception*. A simple idea is a *percept* and a general idea is a *concept*. A term is the name of a percept or of a concept. Hence, terms may be regarded as corresponding to the mental processes of *perception* and *conception*. When the mind compares two ideas and decides whether or not such ideas agree it is said to *judge* ; the resulting product is a *judgment*, and the expression of this in words is a *proposition*, which is, therefore, the logical term corresponding to the mental operation of *judging*.

Finally, reasoning is the process by which one truth is inferred from others, the expression of such complete mental act being a syllogism whenever the reasoning is *deductive*. Hence we see that term, proposition, syllogism, are logical words corresponding to the psychological words perception and conception, judging, reasoning, respectively.

Résumé of Chapter IV.

I. Definitions.

1. A *term* is the name of an idea.
2. A *proposition* consists of two terms and a copula.
3. A *syllogism* consists of three propositions, two being premisses and one conclusion.

II. Terms in a syllogism.

a. The *Minor* term is the subject of the conclusion denoted by the symbol S.

b. The *Middle* term is the term which does not occur in the conclusion, denoted by the symbol M.

c. The *Major* term is the predicate of the conclusion, denoted by the symbol P.

III. Psychological words corresponding to term, proposition, syllogism.

1. *Perception* and *conception* supply ideas, the names of which are *terms*.
2. *Judging* results in a *judgment*, the *expression* of which is a *proposition*.
3. The expression of a complete act of deductive reasoning is a *syllogism*.

Exercises on Chapter IV.

1. Point out the *terms* and *propositions*, distinguishing premisses from conclusion in :—
   a. Socrates is mortal, for Socrates is a man, and all men are mortal.
   b. Diligent students pass their examinations, therefore A B will pass his examination, for he is a diligent student.
   c. S is P, for S is M and M is P.
2. What is the connection between terms and conception?
3. Why do text books of Logic treat of terms before propositions and of propositions before syllogisms?
4. Which is the middle term in the following syllogisms?
   a. All flowers are beautiful : therefore the rose is beautiful, for it is a flower.
   b. Logic is useful, for all science is useful, and Logic is a science.
   c. All coins are useful,
   A shilling is a coin, therefore
   a shilling is useful.
5. Give three original examples of valid syllogisms.

CHAPTER V.

The Laws of Thought.

Before proceeding to treat of terms it will be well to consider somewhat more fully the Laws of Thought referred to in Chapter I. Underlying all valid reasoning there are certain general principles or laws which are usually referred to as "the fundamental laws of thought." They are "laws" of thought, for it is in accordance with them that all valid thought proceeds; and they are fundamental laws, for they are incapable of being derived from other simpler laws.

The fundamental Laws of Thought are three in number:—

1. The Law of Identity, *viz.*, Everything is what it is, or, A is A.
2. The Law of Contradiction, *viz.*, Nothing can both be and not be, or, A cannot both be B and not be B.
3. The Law of Excluded Middle, *viz.*, Everything must either be or not be, or, A either is or is not B.

These laws are the simplest possible expression of the principles underlying valid thought. They are so simple as to be incapable of proof (though of course they may be

illustrated) and as to make the discussion of them seem altogether unnecessary or possibly childish; and they are severally independent, that is, they are all individually incapable of being derived from the others. This must be the case, since each is a fundamental law.

The truth of the first of these laws is perfectly evident, and yet in practice it is constantly being violated. Every time that the same term in the *same* argument is allowed to have two meanings, the Law of Identity is violated. Later on we shall see how frequently this is the case. The student should further notice that this law not only includes such cases as A is A, where the identity is complete, but also such cases as A is B, where the identity is only partial, the identity existing amidst diversity. If we say apples are fruit, we do not mean that apples are identical with fruit, but that some of the qualities of apples are identical with some of the qualities of fruit.

The Law of Contradiction may, at first, appear less evident. It denies that anything can, *at the same time and same place*, both possess an attribute and not possess it, or, which is the same thing, that a statement can be both true and not true at the same time. The paper of this book may be partly white and partly not white (black); but in the same place it cannot both be white and not be white. It is inconceivable that of two contradictories both should be true. Immediate Inferences (see Chapters X., XI.) from affirmative propositions may be shown to depend, for their validity, on the Laws of Identity and of Contradiction. As the Law of Contradiction guards against the admission of two contradictories as true, that is, it preserves the condition of non-contradiction in argument, it would be better called the Law of Non-contradiction.

The Law of Excluded Middle is the least evident of the three laws. Some writers have even thought it untrue, but such thought has arisen from a misconception of its meaning. It has not been sufficiently noticed that the law is concerning *contradictories* and makes no assertion whatever about *contraries*. It asserts that A is or is not B; it does not assert that A is B or is the contrary of B. It is quite true that a piece of iron may be neither hot nor cold; but cold is the *contrary* and not the *contradictory* of hot, the true contradictory being not-hot, and it is inconceivable that a piece of iron, or anything else, should be neither hot nor not-hot—it must be one or the other.

Can we, in accordance with this law, assert that *honesty is, or is not, triangular?* Perhaps the simplest answer to this question is to be found in the fact that the Law of Excluded Middle is a law of *thought*, and has nothing to do with the meaningless, and such an assertion as the above is meaningless. But if we assert that honesty is not triangular are we necessarily to be taken to mean that honesty is not three-sided, but is of some other shape? Not necessarily so. Honesty has no shape at all and cannot therefore be triangular. Even in this case, then, the law holds good. The law has received the somewhat curious name of "excluded middle" from the fact that it asserts that any statement must either be true or not true, thus denying the possibility of the existence of a *middle course*—the possible existence of a middle course is excluded by the law.

These three laws are sometimes spoken of as the *necessary* Laws of Thought, because any one who thinks correctly, of necessity thinks in accordance with them.

The above are the only *fundamental* Laws of Thought; there is, however, another law of great importance, which

was first enunciated by Leibnitz and which is generally referred to as the "Law of Sufficient Reason." It may be stated thus:—"Nothing happens without a sufficient reason why it happens as it does, rather than otherwise." This, however, is not a law by which our thinking is regulated, but rather an assertion that thought is possible concerning any and every phenomenon. There are certain other principles, deducible from the fundamental Laws of Thought, which logicians have enunciated and have regarded as important because logical arguments can be tested by them more easily than by the fundamental Laws of Thought. They are usually spoken of as Canons or Axioms.

A *Canon* is a *rule*, and an *Axiom* is a statement which is so simple that it cannot be proved by reference to simpler statements, and which is, as soon as understood, necessarily regarded as true.

These canons are :—

1. "If two terms agree with one and the same third term, they agree with each other."
2. "If one term agrees and another disagrees with the same third term, these two disagree with each other."

Sometimes another canon is given, viz.,

3. "Two terms, both disagreeing with the same third term, may or may not agree with each other."

The student should compare Euclid's first axiom with the first of these canons. As an illustration of the first, consider the three terms *iridium*, *heaviest metal*, *rarest metal*. If *iridium* and *heaviest metal* both agree with the term *rarest metal*, then *iridium* and *heaviest metal* agree with

each other, or *iridium is the heaviest metal.* Symbolically, if A agrees with B, and C agrees with B, then A agrees with C.

As an illustration of the second canon, consider the terms *London*, *Metropolis*, *Cambridge.* The term *London* does, and the term *Cambridge* does not, agree with the same third term *Metropolis*, therefore they do not agree with each other, or, *London is not Cambridge.*

Again, consider the terms *ivory*, *elephants' tusks*, and *bone.* In this case the terms *ivory* and *elephants' tusks* both disagree with the term *bone*, and they do agree with each other, for *elephants' tusks* are *ivory;* but in the case of the terms, *Ely*, *Metropolis*, *Cambridge*, the first and third disagree with the second and they disagree with each other, for Ely is not Cambridge.

There is still one other rule in Logic that should be mentioned here, viz., Aristotle's *dictum de omni et nullo* (statement concerning all and none). The simplest form of this is:—"Whatever may be predicated distributively of a class may be predicated of every individual in that class, and whatever may be denied distributively of the class may be denied of every individual in it." The first part of this is the *dictum de omni* or *statement concerning all*, and the second part is the *dictum de nullo*, or *statement concerning none.* Thus, we may predicate of the class *material things* that they have weight, therefore the *dictum* says we may predicate of wood that it has weight, for it is part of the class *material things;* and of the class *material things* we may deny that they can reason, therefore we may deny of a *stone*, which is a *material thing*, that it can reason.

Résumé of Chapter V.

I. The fundamental Laws of Thought are —
   1. Law of Identity. Everything is what it is.
   2. Law of Contradiction. Nothing can both be and not be.
   3. Law of Excluded Middle. Everything must either be or not be.

II. The Law of Sufficient Reason is: — "Nothing happens without a sufficient reason why it happens so rather than otherwise."

III. Logical Canons.
   1. If two terms agree with one and the same third term, they agree with each other.
   2. If one term agrees and another does not agree with the same third term, these terms do not agree with each other.
   3. Two terms, both disagreeing with the same third term, may or may not agree with each other.

IV. Aristotle's *dictum de omni et nullo* is:—"Whatever may be predicated distributively of a class may be predicated of every individual in that class; and whatever may be denied distributively of a class may be denied of every individual in that class."

Exercises on Chapter V.

1. What is a law?
2. What is a fundamental law?
3. Enunciate and illustrate the Law of Contradiction.
4. Enunciate and illustrate the Law of Excluded Middle.

5. It has been said :—"A door may be neither open nor shut, but ajar, therefore the Law of Excluded Middle does not hold." Answer this objection.
6. Explain *canon* and *axiom*, giving examples.
7. Show, by using Aristotle's dictum, that the conclusion *Apples are useful* follows from the premisses, *apples are fruit*, and *all fruit is useful*.
8. Illustrate the first of the three logical canons.

CHAPTER VI.

Terms.

In Chapter IV. we saw that a proposition consists of two names or terms and a copula. In this and the following chapter we proceed to examine terms more closely.

The philosopher Hobbes, nearly two hundred and fifty years ago, defined a name or term in these words :—"A name is a word taken at pleasure to serve for a mark which may raise in our minds a thought like to some thought we had before, and which, being pronounced to others, may be to them a sign of what thought the speaker had or had not before in his mind." The words "or had not" may be omitted without injuring the definition. Hobbes introduced them in order to make the definition embrace the names of negative ideas, an explanation of which will be given shortly.

Note carefully the two purposes served by terms :—

1. As *marks* to recall ideas (for that is what Hobbes means by "thoughts") which we have had previously in mind.
2. As *signs* to others of the ideas we have in mind.

The word *term* is merely a curtailed form of the Latin word *terminus*, an end, and was applied to the names of a proposition, because such names form the *ends* of the proposition. Strictly speaking, names are *terms* only when

they occur in propositions. Generally, however, all names are called terms, as being able to constitute the ends of propositions. A term may consist of any number of words. Thus in the proposition, "*Victoria, Queen of England, Ireland, Scotland and Wales, and Empress of India*, resides at Windsor," the twelve words in italics, constituting the subject of the proposition, form but one term. Clearly all words cannot stand alone as terms. We cannot say, "Very is honest". Words that can stand alone as terms are called *categorematic* ; words that cannot, *syncategorematic.* If, however, a syncategorematic word be itself regarded as a thing, it can stand alone as a term. Thus we can say "Very is an adverb" meaning the word "very" is an adverb. This looking upon a word as a thing is known as *Suppositio materialis.*

Adjectives are to be classed as categorematic words, for in such a proposition as, *the day is warm*, *warm* is a term.

Since terms may consist of any number of words, they may be arranged in two classes.

1. Single-worded terms.
2. Many-worded terms.

A *single-worded term* consists of one word only, which must of course be a categorematic word. Thus, the terms in a proposition such as—

Coal is useful,

are single-worded terms.

A *many-worded term* is one consisting of more than one word, as, for instance, *the angles at the base of an isosceles triangle.*

Again terms are :—

1. Individual or Singular, and
2. General.

An *individual* or *singular* term is a name applicable in the same sense to only one thing, as *the Queen*, *my house*. Those names which in Grammar are known as proper nouns are logically individual terms, for though such a term as John may be applied to many different persons, yet when used it always refers definitely to one and it is incapable of being applied in the *same sense* to another. In the proposition—

He is quite a Milton,

the term Milton is the name of a class, as is clear from the fact that the article *a* goes with it ; it is a *general* term and grammatically a common noun.

A *general term* is one that can be applied in the *same sense* to an indefinite number of things. Thus *pen* is a general term, for it is applicable in the same sense to an indefinite number of objects, all of which have certain common qualities which constitute the meaning of the term *pen*. Since these objects possess certain common qualities, we may regard them as forming a class which contains every object possessing these qualities. The name of this class is a general term, and every general term is a class name.

A general term is, from the psychological point of view, the name of a concept, which has been already defined as a general idea (see Chapter IV.). The above division of terms into the two classes of *individual* and *general* terms is exhaustive, that is, every term must belong to one or other of these classes. Both individual and general terms may be used in a *collective* sense, that is, as the name of a number of things regarded as forming one whole ; when so used they are often called *collective terms*.

The collective use of *individual* terms is not of frequent occurrence. The *British Army*, *the Andes*, the *English*

Nobility, are examples. General terms are of much more frequent occurrence as collective terms ; thus, *crowd*, *army*, *nation*, *mob*, *fleet*, etc., are examples of words that may be used as collective terms. The student should carefully note that it is impossible to say of any given term, such as *forest*, whether or not it is collective. It depends entirely on its use. Thus, if the word *forest* is used to denote a number of trees it is a collective term, but if used to mean *one of a number of forests* it is a general term. The collective term being the name of a number of objects, regarded as one, cannot be applied to the objects individually, but collectively only ; on the other hand, the general term can be applied individually to the objects constituting the class of which it is the name.

Another division of terms is into

1. Concrete, and
2. Abstract

} terms.

A *concrete term* is the name of a thing, an *abstract term* is the name of an attribute of a thing, considered apart from the thing to which such attribute belongs. The word *thing*, it should be noticed, is used in its widest possible sense to denote every possible notion except those of attributes. There are non-material as well as material things. Thus, *mind*, *thought*, *will*, *ghost*, are names of things, although they are not material. The process by which the mind withdraws or abstracts its attention from all other qualities and fixes it on a certain one is called *abstraction*. The name of such quality contemplated by abstraction is an abstract term.

Thus, we talk of *honest people*. If we think of the quality from the possession of which they are called *honest*, and apply a name to it we have the abstract term

honesty. Adjectives are *concrete* terms, not *abstract*, for they always express some quality as belonging to an object and not considered as apart from such object; thus in the proposition "iron is heavy" it is not meant that iron is the quality denoted by the word heavy, but that it is a thing possessing such a quality; so again the proposition "Great is Diana of the Ephesians" does not mean that Diana of the Ephesians is the *quality* greatness, but that Diana is a great being or great goddess. Logically there is no distinction in kind between the term "great" in "Diana is great" and the term "goddess" in "Diana is a goddess". To every concrete term there is, or may be, a corresponding abstract term; thus *soapiness*, *inkiness*, *sweetness*, *nakedness*, are the abstract terms corresponding respectively to the concrete terms *soap*, *ink*, *sweet*, *naked*. Whether the abstract corresponding to a given concrete term exists in English or not is a mere accident of our language. If the need of the abstract has been frequently felt, someone is sure to have invented it and others to have used it; but if the need has never, or only occasionally, been felt, the corresponding abstract does not exist. Thus *orange*, *apple*, *potato*, *book*, *window*, are concrete terms to which corresponding abstract terms are not to be found in our dictionaries.

It is a fact deserving notice that an abstract term frequently, in course of time, becomes concrete. This arises from the difficulty of abstraction to the uneducated mind. Thus, *relation*, which properly denotes *the connection between relatives*, is frequently used concretely for *relative*; thus, we talk of our *friends and relations*, meaning *friends and relatives*.

To what a large extent this change of abstract to concrete terms has been carried on may be seen by noticing the

present meaning of terms whose endings indicate that originally they were abstract. It will be found that many, perhaps the majority, of such terms are now used as concrete general terms. Thus all words ending in -tion, -sion, were originally abstract; but now such words as benediction, proposition, proportion, addition, nation, and dozens of others, are generally used as concrete terms.

Another way of dividing terms is into the two classes—

1. Positive.
2. Negative.

A *positive term* is one which signifies the presence of some one or more qualities. In accordance with the Law of Excluded Middle, everything in the universe must either belong or not belong to the class denoted by any name. Thus, let the name be metal, then everything is, or is not, metal. If we frame a word to denote everything that is not metal (*non-metal*, say) then *metal* is a positive and *non-metal* the corresponding negative term. In many cases it is difficult to say which is the positive and which the negative term, and frequently it is a matter of little or no importance which is called positive, so long as the other is called negative.

The student will notice that certain prefixes are indicative of the absence of a quality, that is, of a negative term; such prefixes, for example, as *un-*, *in-*, *dis-*, *non-*, are of this nature. The form of a word is, however, often misleading; thus in form *inconvenient* is a negative term, but it seldom, if ever, denotes the mere absence of convenience, but rather implies the presence of actual trouble, and it should, therefore, be regarded as a positive term.

When a negative term implies the absence of a quality which was once present, or which might be expected to be

present, such term is called *privative*, *e.g.*, blind, dead, dumb, etc.

A positive and its corresponding negative are contradictory terms, each being the contradictory of the other. *Contradictory* terms must be carefully distinguished from what are called *contrary terms*. The *contrary* of a term is one denoting what is farthest removed from that term. Contrary terms are often called *opposite* terms. Thus *small* is the contrary or opposite of *great*, the strict contradictory of which is *not-great:* so *not-white* and *black* are the *contradictory* and *contrary* respectively of *white*. This is a distinction of great logical importance, and should, therefore, be carefully remembered.

Still one further way of dividing terms must be here noticed.

Terms are—1. Relative, or
2. Absolute.

A *relative term* is one which, besides denoting an object, implies the existence of another object without reference to which it is unintelligible; thus the term *king* can be understood only by reference to *subject*, and *subject* only by reference to *king*.

An *absolute* or *non-relative* term is one which denotes an object without any direct reference to the existence of another object, as, for instance, *sun*.

It is often impossible to say of a term apart from its context whether it is relative or absolute; thus *man* is a relative term when used in contra-distinction to *woman*, but it is absolute when meaning mankind.

Relative terms evidently go in pairs – as parent, child; king, subject; shepherd, sheep; teacher, pupil; every pair consisting of two *correlative terms*. That which constitutes

the bond or connection between any pair of correlatives is called the *fundamentum relationis*. For instance, the *fundamentum relationis* in the case of the correlatives teacher, pupil, is the *giving of instruction* in the case of the teacher and the *receiving of such instruction* in the case of the pupil. In some cases a pair of correlatives have but one name ; thus, the correlative of *friend* is *friend*, of *foe* is *foe*, of *brother* is *brother*, though it might be *sister*.

Résumé of Chapter VI.

I. Words are—

1. Categorematic,
2. Syncategorematic.

The former can stand alone as terms, the latter cannot.

II. There are several ways of dividing terms, as into

1. *a*. Single-worded terms.
   b. Many-worded terms.

   A single-worded term is a categorematic word.
2. *a*. Individual or singular terms are those applicable to only one thing in the same sense.
   b. General terms are applicable in the same sense to every one of a class of things.
3. *a*. Terms used distributively.
   b. Terms used collectively, namely, when applied to a number of things regarded as one whole.
4. *a*. Concrete, being the names of things.
   b. Abstract, being the names of qualities.

   Adjectives are concrete. Corresponding to any given concrete an abstract may, but does not always, exist.

5. *a*. Positive terms implying the presence of qualities.
   b. Negative terms implying the absence of certain qualities.
   c. Privative terms implying the absence of qualities which might be expected to be present.
6. *a*. Relative terms. A relative term is one which is intelligible only by direct reference to another term.
   b. Absolute terms : An absolute term makes no direct reference to another term.

Exercises on Chapter VI.

In giving the logical characters of terms the student should say whether they are—

1. Single-worded or many-worded.
2. Singular or general.
3. Collective or distributive.
4. Concrete or abstract.
5. Positive, negative or privative.
6. Relative or absolute, *e.g.*—

   The Sun :—Many-worded, singular, concrete, positive, absolute.

   Blind :—Single-worded, general, concrete, privative, absolute. If there is any doubt as to the meaning of a term, it should be stated what such term is understood to mean, and its character given accordingly.

1. Give the logical characters of :—woman, king, school, church, army, honesty, moon, the moon, star, table, relation, relative, good, evil.

2. Explain the difference between contradictory and contrary terms.
3. Is the term *idle*, positive, negative, or privative? Give full reasons for your answer.
4. Give the negative of:—equal, great, London, good, tall, teacher.
5. Explain *fundamentum relationis*.
6. What is a collective term? Is the term *navy* collective?

CHAPTER VII.

Terms—(Continued).

We have now to consider an exceedingly important point with regard to terms, and one that will need the closest attention to be clearly understood.

Examine closely the meaning of any general term, such as *school*. This evidently includes, in its meaning, St. Paul's School, Westminster School, City of London School, and all buildings in the world which are rightly called "schools". All objects, then, which correctly bear the name *school*, are, in one sense, the meaning of the term *school*. They are the extent to which the term is applied, and form, therefore, what is sometimes called the *meaning in extension* of the term *school*. Similarly, every other general term has a meaning in extension, such meaning being all the objects forming the class of which the term is a name. But all general terms will be found to have another meaning. Consider further the term school. Before the term school can be applied to an object, such object must possess certain qualities: it must at least be a building in which teaching is carried on. Every general term is a name applied to all the individual objects constituting a class and any object can belong to such class only in consequence of the possession of those attributes on which the class is based. Hence, these attributes must be possessed by any object

before the class name or general term can be applied to it. The application of a general term to any object clearly, then, conveys certain information about that object, such information being, in one sense, the meaning of the term. This meaning is sometimes called *the meaning in intension*, the term *intension* being used in contra-distinction to *extension*. Thus, the meaning in extension of the term school is the number of things which are rightly called schools, and its meaning in intension is the *qualities* any object must possess before it can rightly be called a school. The meaning in extension is evidently the objects *denoted* by the term, and may, therefore, more conveniently be called the *denotation* of the term ; as a correlative to this, the meaning in intension may be called *connotation*. These terms were first used by Mill, with these meanings. They are convenient, as we have the corresponding verbs to *denote*, and to *connote*, as well as the adjective *connotative*.

Moreover, their meaning is suggested by their etymology ; to denote (Lat. *de*, down, and *noto*, I mark) is to mark down the objects to which the name may be applied, and to *connote* (Lat. *con*, along with, and *noto*, I mark) is to mark the qualities along with the objects.

There is a close connection between the denotation and the connotation of a term. Consider the term *book*. Now to *book* add *English*, so that the term becomes *English book*. Evidently, there are fewer *English books* than *books* in existence, and hence the denotation is decreased. By adding *English*, then, to the term *book* we obtain a new term, viz., *English book*, the denotation of which is less than that of book. The connotation of book is a certain number of qualities, all of which are connoted by the term *English book*, which also connotes the additional quality of

being printed in English. Hence, by adding English to the term book we obtain a new term, viz., *English book*, the connotation of which is greater than that of *book*.

If we make to *English book* an addition expressing another quality we shall still further increase connotation and decrease denotation. Thus, if we add *on logic*, we have the term *English book on logic*, the connotation of which is greater than that of *English book*, and the denotation is less, for clearly there are fewer *English books on logic* than there are *English books*. If the process were continued we should finally obtain a term the connotation of which would be so great that the term could be applied to only one object, which object would form the denotation of the term. *English book on logic which you are reading* is clearly such a term, for the connotation is such that it applies to only one object.

It is clear, from what has just been said, that if the denotation of a term be decreased the connotation will be increased, and that if the denotation be increased, the connotation will be decreased. This is sometimes expressed by saying that the *connotation increases as the denotation decreases*. It must, however, be noticed that the ratios between the connotation and denotation of two terms do not form a mathematical proportion. Thus, we must not suppose that the connotation of *English book* bears the same numerical relation to the connotation of *book* as the denotation of *book* bears to the denotation of *English book*. By a slight increase of connotation the denotation may be very greatly reduced. Thus, if to the term *mountain* we add *of altitude of above 29,000 feet*, the denotation is reduced to a minimum, for the term, *mountain of altitude of above 29,000 feet* denotes one

object only, viz., Mt. Everest. If, however, we add *of altitude of more than 3,000 feet*, the connotation is increased as much as in the previous case, although the denotation is decreased not nearly so much.

Now the question arises whether all terms have connotation or not. This question may be answered by the consideration of an example. If, on seeing a number of buildings in the distance, I ask what place it is, and I am told in reply that it is *Cambridge*, it is evident that such answer gives me no knowledge of the place itself. It tells me that there is a place called Cambridge, but it tells me none of the attributes of such place. I may possibly know that Cambridge is a *town* and *the seat of a University*, in which case, on hearing the term Cambridge, there instantly arises in my mind the fact that it is a town and the seat of a University. But the term *Cambridge* merely *suggests* such information by association of ideas; in no sense can such information be regarded as the *meaning* of the term. But if, in answer to my question, I am told that the place is a *town*, then the word itself does convey real information, viz., whatever is connoted by the term *town*. The term *Cambridge* has no connotation, but the term *town* has connotation. Terms possessing connotation are called *connotative* terms, and those not having connotation *non-connotative* terms. A connotative term denotes a thing and implies one or more attributes. It is clear that all general terms, all adjectives (which are general terms) and collective terms (except proper names, such as the Pyrenees) are connotative. A non-connotative term only denotes a thing or an attribute. All terms which grammatically are called proper nouns, are non-connotative. A proper noun is never the name of a class.

Of course, a proper noun may be used to designate a class, implying that every member of the class possesses the qualities characteristic of that to which such proper noun was first applied, but then in such use it is not a proper noun or individual term, but a class name or general term. In such a sentence as:—"He is quite a Shakespeare," the word Shakespeare is no more a proper noun than is the word poet in the sentence "He is quite a poet".

All *singular abstract terms* denote an attribute only and are, therefore, *non-connotative*. Abstract nouns, however, that can be used in the plural, such as, *colour*, *virtue*, *vice*, are the names of classes, that is, they are general terms and as such have connotation. The student is recommended to make himself thoroughly familiar with the terms denotation and connotation, as a thorough understanding of them is of the highest importance. Though the distinction between them is a perfectly definite and clear one, yet many students seem to find great difficulty in understanding it.

Résumé of Chapter VII.

I. 1. The denotation or meaning in extension of a term is the objects to which the term can be applied.

2. The connotation or meaning in intension is that quality or those qualities which an object must possess in order that such term may be rightly applied to it.

Denotation is *things*: *connotation* is *qualities*.

3. By increasing connotation, denotation is decreased, and by decreasing connotation, denotation is increased.

II. Terms are *connotative* or *non-connotative*.

1. A connotative term denotes a thing and implies one quality or more.
2. A non-connotative term denotes a thing only or an attribute only.
3. General terms, adjectives, and collective terms, are connotative.
4. Proper names and singular abstract terms are non-connotative.

Exercises on Chapter VII.

1. What is the denotation of a term?
2. What is the connotation of a term?
3. Give three examples of connotative and three of non-connotative terms.
4. What is the denotation of :—fish, man, book, servant, bird, table?
5. What is the connotation of :—triangle, line, book, animal?
6. Show that by increasing the connotation of the term *ship* its denotation is decreased.
7. Why have proper names no connotation?
8. Criticise the assertion that the denotation decreases as the connotation increases.

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CHAPTER VIII.

Propositions.

The student has already from Chapter IV. gained some idea of the meaning of the word *proposition*; we proceed to discuss its meaning more fully. Consider the pair of terms —*sugar, sweet.* Do they agree? If so, we may say *sugar is sweet.* Do they not agree? If they do not we may say *sugar is not sweet.* So of the terms *silver, tenacious.* If we think they agree, we say *silver is tenacious*; but if we decide that they do not agree, we say *silver is not tenacious.* So again of the terms *gold, malleable.* We first decide as to whether or not they agree, and then we make the statement *gold is malleable* or *gold is not malleable.* What we decide in every such case is whether or not our ideas of the meanings of the two terms agree; and to express such decision we make use of what is called a *proposition.* A proposition may be defined, then, as *the assertion or the denial of agreement between two terms.*

A general term is, as already stated (Chapter VI.), the name of a *concept.* Thus, the term *tree* is to me a name of whatever is in my mind when I think of tree in general without special reference to any particular tree, that is, it is the name of my *concept* of tree.

The mental process by which we decide whether or not one concept may be regarded as connected with another

concept is what the psychologist means by *judging*, and the result of such process is a *judgment*, the verbal expression of which is a proposition. A proposition may, in fact, be defined as *the expression of a judgment*. The student will easily see that this definition is in reality the same as that given above, where a proposition is defined as the assertion or denial of agreement between two terms. It is clear, then, that every proposition is a sentence ; it is not true, however, that every sentence is a proposition. Those sentences only which unconditionally or conditionally assert facts are propositions.

Hence—

Mere exclamatory sentences
Interrogative sentences
Imperative sentences
} are not propositions.

None of these express *thought*, which is the subject matter of Logic.

It has already (Chapter IV.) been pointed out that every proposition consists of two terms connected by a copula, which copula is always the *present* tense of the verb *to be*, affirmative or negative, and all sentences should be reduced to this form before attempting to apply any of the rules of Logic to them. Thus, the sentence, *Familiarity breeds contempt*, in the strict form of a logical proposition is, *familiarity is a thing which breeds contempt*, in which *familiarity* is the subject, *is* the copula, and *a thing which breeds contempt* the predicate. So the logical form of *birds fly* is *birds are things which fly*, the terms being, *birds* and *things which fly*. In Logic, it is always allowable to change the wording of a proposition, provided the meaning is not changed. A most important part of the usefulness of Logic as a means of mental discipline, is that which is involved

in the careful examination of common forms of expression and in the reduction of such to typical logical forms.

Propositions are of three kinds—

1. Categorical.
2. Conditional or hypothetical.
3. Disjunctive.

A proposition is (1) *categorical* when the predicate is simply, directly and unconditionally affirmed or denied of the subject, *e.g., gold is yellow, silver is useful, rain is falling.*

(2). A conditional proposition is one in which the predicate is affirmed or denied of the subject under one or more conditions, *e.g., if this is gold it is yellow; if he works hard he will pass his examination; if the wind is in the east it is cold.*

A proposition is (3) *disjunctive* when it asserts or denies the truth of some one of two or more facts but does not definitely assert or deny the truth of any given one; *e.g., he is either a Spaniard or an Italian; the prisoner will be found guilty or he will be acquitted.*

Nothing further need be said at present on the subject of conditional and disjunctive propositions; we shall, however, discuss them more fully later on. For some time our whole attention will be given to categorical propositions.

Can categorical propositions be classified? The most evident way of classifying them is to arrange them in two classes according to the absence or presence of "not" or its equivalent in the copula. We have then—

I. *Affirmative propositions*, or those in which the copula does not include a negative particle, *e.g., the man is honest.*

II. *Negative propositions*, or those in which the copula does include a negative particle, *e.g., the man is not honest.*

This is a classification according to *quality*. By the Law of Excluded Middle every proposition must be of *affirmative* or of *negative* quality. All propositions that affirm the agreement of two terms are of affirmative quality, and all that deny such agreement are of negative quality.

Propositions may also be arranged in two classes by considering their *quantity*. The *quantity* of propositions depends upon whether the predicate is explicitly affirmed or denied of the whole of the subject or not.

Propositions in which the predicate is affirmed or denied definitely of the whole of the subject are said to be of *universal quantity*, or more shortly, *universal;* propositions in which the predicate is affirmed or denied of some indefinite part of the subject are said to be of *particular quantity*, or more briefly, *particular*. Thus, *All Englishmen are brave* is a universal proposition, because "bravery" is affirmed explicitly of the whole denotation of the subject; but in *some Englishmen are brave*, bravery is only affirmed of some indefinite part of the subject, and the proposition is, therefore, particular. If we combine this classification according to *quantity* with the classification according to *quality*, we shall have four classes of propositions—

I.	Universal.	1. Affirmative.	Symbol	A.
	,,	2. Negative.	,,	E.
II.	Particular.	3. Affirmative.	,,	I.
	,,	4. Negative.	,,	O.

These may be typically represented thus :—

Universal Affirmative,	All S's are P,	A
Universal Negative,	No S's are P,	E
Particular Affirmative,	Some S's are P,	I
Particular Negative,	Some S's are not P,	O

The letters A, E, I, O, are used for the sake of brevity as symbols of the four classes of propositions, respectively, after which they are placed. By an A proposition is meant a *universal affirmative*, by an E proposition a *universal negative*, by an I proposition a *particular affirmative*, and by an O proposition a *particular negative*. These symbols are very convenient and are constantly used in Logic; the student should, therefore, learn them thoroughly at once. As a help to remembering them it may be noticed that A and I, the symbols for affirmative propositions, are the first two vowels in *affirmo*, the Latin word for *I affirm;* and that E and O are the vowels in *nego*, the Latin word for *I deny*.

The four classes of propositions, A, E, I, O, may conveniently be symbolised by SaP, SeP, SiP, SoP, respectively, the vowel of each of these combinations denoting the quality and quantity of the proposition symbolised.

Hence the proposition :—

All S's are P	is represented by	either	A or SaP
No S's are P	,,	,,	E or SeP
Some S's are P	,,	,,	I or SiP
and Some S's are not P	,,	,,	O or SoP

This fourfold classification of propositions is exhaustive, that is, every categorical proposition belongs to one or other of the four classes. It is not, however, always easy to say at once to which class a proposition belongs; thus, in the case of the proposition, *Socrates is mortal*, it is not at once evident whether this is SaP or SiP. In this case and in all similar cases, the predication is made of the whole denotation of the subject, although that denotation extends to but one individual, and, therefore, it must be SaP.

Singular propositions, that is propositions having singular terms for their subjects, are always *universal*.

Some propositions do not by their form enable us to tell whether they are universal or particular, *e.g.*, *metals are heavy*. Such propositions are said to be *indefinite* or *indesignate*. Such propositions must be classified according to the meaning the students think they are intended to express. If the above is intended to mean *all metals are heavy*, it is of course SaP; if not, it is SiP. Until the meaning of indefinite propositions be settled they have no place in Logic.

It is most important to notice that in I and O propositions the *some* is altogether indefinite. Thus, when it is asserted that *some boys are clever*, it must not be taken to mean that some boys are and some are not clever. Cleverness is predicated of *some* boys, an *indefinite some*; of how many such predication is made it is altogether doubtful; it must be of one at least, and it may be of all.

One other way of classifying categorical propositions should be noticed, viz., into the classes *explicative* propositions and *ampliative* propositions. *Explicative* or *essential* propositions merely unfold the meaning of the subject term. They convey no knowledge beyond what is contained in the subject term if such term be understood.

A triangle is a figure bounded by three lines is an *explicative* proposition, as it merely unfolds the meaning of the term *triangle*. All definitions are explicative propositions. All propositions that really supply knowledge besides that contained in the meaning of the subject are called *ampliative* propositions, because they *amplify* or enlarge our knowledge. Thus the proposition, *roses are beautiful*, predicates of roses the quality (beauty), which is no part of the connotation of *rose*, and is therefore an ampliative proposition. This division of propositions is of historical interest rather than of logical importance.

Résumé of Chapter VIII.

I. Propositions.

1. Definition:—A proposition is the assertion or the denial of agreement between two terms; or, A proposition is the expression of a judgment.
2. Kinds of propositions.
   a. *Categorical*, which simply and definitely assert something of the subject.
   b. *Conditional or hypothetical*, which make an assertion under certain conditions.
   c. *Disjunctive*, which affirm that one of two or more alternatives is true.

II. Categorical propositions.

1. The *quality* is determined by the absence or presence of the negative particle.
2. By the *quantity* of a proposition is meant whether it is *universal* or *particular*.
3. The classification of categorical propositions is based on the *quantity* and *quality*.
   a. There are four classes—
      A. Universal affirmative. All S's are P. SaP.
      E. Universal negative. No S's are P. SeP.
      I. Particular affirmative. Some S's are P. SiP.
      O. Particular negative. Some S's are not P. SoP.
   b. *Singular* propositions are classed as *universals*.
   c. Indefinite propositions, while indefinite, do not belong to Logic.
4. "Some" in Logic has an indefinite meaning—one at least, it may be more, even *all*.

III. Categorical propositions may be classed as—

1. *Explicative* propositions, which merely unfold the meaning of the subject; and
2. *Ampliative* propositions, which convey information over and above what is contained in the meaning of the subject term.

Exercises on Chapter VIII.

1. Which of these propositions belong to Logic? Why?
   a. Go thou, and do likewise.
   b. Oh! that I had listened to you!
   c. The greater the knowledge, the greater the modesty.
   d. Shall I see you to-morrow?
   e. Cleanliness is next to godliness.
   f. To thine own self be true.
2. Analyse the following into subject, copula, and predicate.
   a. London is a large city.
   b. Hope springs eternal in the human breast.
   c. A thing of beauty is a joy for ever.
   d. Its loveliness increases.
   e. Great is Diana of the Ephesians.
   f. P struck Q.
3. Classify the following propositions according to quantity and quality, *i.e.*, say whether they are A, E, I or O.
   a. All metals are heavy.
   b. No money is useless.
   c. Some birds do not fly.
   d. Money is useful.
   e. Honesty is the best policy.
   f. London is a large city.
   g. Man is a rational animal.

4. Classify the propositions in question 3 into explicative and ampliative propositions.
5. Explain the meaning of *some* in *some men are rogues*.
6. Why is E written in the form *no S's are P*, and not in the form *all S's are not P?*
7. Express the following in strict logical form, adding the symbol to each:—

a. Men form theories.
b. Women jump to conclusions.
c. Teaching is wearying work.
d. Birds are not quadrupeds.
e. Anglo-Saxon is Old English.
f. Fish swim.
g. Man is mortal.
h. P struck Q.
i. Logic is difficult.
j. Shakespeare is many-sided.
k. It is better late than never.
l. I wish you many happy returns of the day.

CHAPTER IX.

Propositions and Distribution of Terms.

In the last chapter we have seen that a proposition is the assertion or the denial of an agreement between two terms; but terms have connotation and denotation. Is it the connotation or the denotation of the terms in a proposition that is most naturally suggested when the proposition is used? To answer this question is to give the *import* of propositions. The proposition—

Logic is useful

clearly affirms that *utility* is an *attribute* of Logic. The student will have no difficulty in understanding this, as the predicate is an adjective; it is equally true when the predicate is a noun. Thus if we say—

An apple is a fruit,

our meaning is, that whatever *attributes* belong to fruit in general belong to an apple; the predicate, although a noun, is really thought of as an adjective, but the subject of the proposition is regarded as a noun denoting a thing. That the predicate is really thought of as an adjective, even although it is grammatically a noun, may be seen from the fact that frequently the noun may be replaced by an adjective, without any material change of meaning.

Thus we may say—

Men are mortals or *men are mortal.*

Hence, in using a proposition, *things* are suggested to the mind by the subject, and *attributes* by the predicate. Logicians usually express this by saying that the *subject* of a proposition is read in *denotation*, but the predicate in *connotation*. The predicate in any categorical proposition expresses the qualities which we affirm or deny of some or all of the subject. Thus, in *Man is mortal*, the attribute *mortality* is predicated of all included in the class man.

Psychologically, then, the predicate of a proposition is to be regarded as an adjective; it is, however, for logical purposes, often convenient to regard the predicate as a class to which the subject class bears a certain relation, or one of a number of possible relations. This is of course always possible although it is not the most natural way of regarding the predicate of a proposition, as we have just seen. In the A proposition, all S's are P, it is asserted that the attributes which form the connotation of P belong to all the class denoted by S; hence, in such a statement, the whole denotation of S is contemplated, or the assertion is intended to apply to every S. When a term is thus referred to in its whole extent, it is said to be *distributed;* but when the whole denotation of a term is not explicitly referred to, the term is said to be *undistributed.*

The distribution of terms is a matter of some difficulty. The student should give his best attention to everything on the subject in this chapter.

From what is said above it is clear that the subject of an A proposition is *distributed*; in fact, it is because its subject is distributed that it is called *universal.*

We have seen that psychologically the predicate of a proposition is an adjective; for the application and illustration of logical rules, it must, however, be regarded as

a class having denotation as well as connotation. From this point of view, we may consider whether the predicate of a proposition is distributed or not. Is the predicate of SaP distributed? Clearly it is not. In the proposition—

All owls are birds,

the class birds is not referred to in its whole denotation, for there are many birds besides owls. In the proposition—

All boys and girls are children,

the predicate, *children*, as a matter of fact, is used in its whole denotation, for there are no *children* other than *boys and girls*. The question is, however, do we know this fact from the proposition itself? The proposition, clearly, no more tells us that *all children* are referred to than the proposition *all owls are birds* tells us that *all birds* are referred to, and, therefore, the predicate is no more distributed in the one case than in the other.

This may be illustrated by the diagrams which were first used by Euler, a German mathematician and logician. If we regard both subject and predicate as class names we may represent the subject class by one circle, and the predicate class by another.

Thus

may be regarded as a symbol for the whole denotation of the subject, and

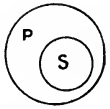
as a symbol for the denotation of the predicate.

There are five possible relations between the two classes

and

1. The case in which

is wholly included in

(P) but is not the whole of (P). This case may be represented by 

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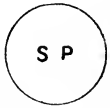
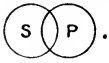
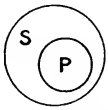
2. The case in which (S) and (P) coincide. The symbol for this is 

.

3. The case in which (S) and (P) partly coincide, part of (S) being outside of (P) and (P) being partly outside of (S). The symbol is 

.

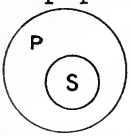
4. The case in which (P) is wholly included in (S) but is not the whole of (S); the symbol is 

; and

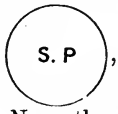
5. The case in which (S) is entirely outside of (P); this may be represented thus, (S) (P).

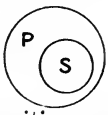
These are the only possible relations between the two classes (S) and (P).

Every proposition, then, affirms some relation between subject and predicate which relation can be represented by some one, or more, of the above five diagrams. Now we are in a position to use these symbols to illustrate the A proposition.

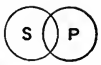
The proposition, *all owls are birds*, may be represented by 

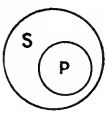
, where S stands for *owls*, and P for birds. This diagram shows at once that there are some P's which are not S's, or some *birds* which are not *owls*.

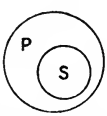
The proposition, *all boys and girls are children*, may be represented by 

, for subject and predicate in this case coincide. Now, the form of the proposition does not tell us which of these two diagrams should be used to represent it. Hence, to represent SaP fully, we must use both. The universal affirmative proposition then, must be represented by 

In the I proposition, some S's are P, the subject *some S's* is, as we have already seen, quite indefinite, the only thing definitely known of its extent is that it does not explicitly refer to the whole denotation of the class S. Hence, the subject of SiP is *undistributed*. The predicate also clearly is *undistributed*, for when we say *some apples are good to eat*, we certainly do not mean to assert that the only *things good to eat* are *apples*, there being many other edible things to which the predicate makes no reference. The following are all examples of I propositions, and are clearly represented by the diagrams as given to each.

1. Some fruits are edible 

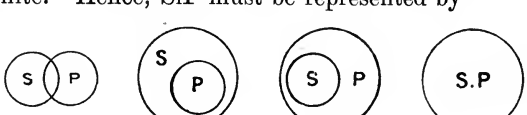
2. Some elements are metals 

3. Some birds are bipeds 

4. Some equilateral triangles are equiangular

It will be noticed that the symbols affixed to 3 and 4 are the same as those used above to represent the A proposition. It is clear that if the relation expressed by SaP is true, the relation expressed by SiP must be true. If *all owls are birds*, it must also be true that *some owls are birds*. We shall return to this point in the following chapter.

Now, the form of the proposition is the same in each of the above four cases. Hence, the form of the proposition does not enable us to say which of the diagrams should be used to represent any given I proposition. This is only the same thing as saying that the meaning of *some* is altogether indefinite. Hence, SiP must be represented by



The first is the most typical symbol and is sometimes used alone, though inaccurately, to represent the I proposition.

In the E proposition, *no S's are P*, the attributes implied in P are denied of *all S's;* hence the subject is distributed.

This proposition may be represented by two separate circles

, representing that no part of the class S is the class P, and clearly showing also that no part of P is in S. Hence, the whole denotation of P is as explicitly referred to as is that of S. The predicate of SeP is, therefore, distributed as well as the subject. Note that only one symbol is needed to represent SeP; the reason of this is that both S and P are definitely referred to in their whole extent, that is, are *distributed.*

In the O proposition, *some S's are not P*, the subject clearly is not explicitly referred to in its whole extent and is, therefore, *not distributed.* That the subject of SiP and SoP is undistributed follows immediately from their definition as particular propositions.

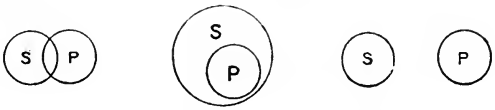
Is the predicate of SoP distributed? This is the most difficult point in connection with the distribution of terms and requires the student's closest attention. In the proposition—

Some elements are not metals,

the subject *some elements* is affirmed to be altogether excluded from the class *metals*; of *all* metals it is denied that any agree with the *some elements* of the subject. Hence the predicate of O is *distributed.*

Owing to the indefinite meaning of the word *some*, it may easily be seen that SoP does not definitely affirm any one of the five possible relations between subject and predicate, but merely affirms that of three of such relations one at least is true. The relations between S and P that the proposition, *some S's are not P*, may include are (3) (4) and (5) as enumerated on page 58.

Hence to represent SoP by Euler's diagrams we must use the three—



The proposition itself always leaves it doubtful as to which of these three diagrams would represent the actual relation between S and P ; this is owing to the indefiniteness of the *some* of the subject. These diagrams make it evident at once that the whole of P is excluded from at least a part of S—another way of seeing that the predicate of SoP is *distributed.*

Collecting the results of our examination of the quantity of the subject and predicate in each of the four classes of propositions, we have—

	Subject.	Predicate.
A or SaP	Distributed	Undistributed
E or SeP	Distributed	Distributed
I or SiP	Undistributed	Undistributed
O or SoP	Undistributed	Distributed

It will be seen at a glance that—

1. Universal propositions distribute their subjects.
2. Particular propositions have undistributed subjects.
3. Affirmative propositions have undistributed predicates.
4. Negative propositions distribute their predicates.

As much of the doctrine of the syllogism depends on the distribution of terms, it is of the greatest importance that the student should make himself thoroughly familiar with the results of this chapter.

The Mnemonic word *Asebinop** may help some students to remember which terms are distributed and which not. In this there are four vowels—A, E, I, and O, which are the symbols of the four classes of categorical propositions.

A is followed by *s*, which stands for *subject*.

E is followed by *b*, which stands for *both* subject and predicate.

I is followed by *n*, which stands for *neither* subject nor predicate.

O is followed by *p*, which stands for *predicate*.

Hence, *Asebinop* may help the student to remember that

A distributes its subject and not its predicate ; that

E distributes both subject and predicate ; that

I distributes neither subject nor predicate ; and that

O distributes its predicate.

Résumé of Chapter IX.

I. In a proposition the *subject* is read in *denotation*, the *predicate* in *connotation*.

II. *Distribution*—

1. A term is *distributed* when explicitly referred to in its whole extent.
2. A term is *undistributed* when the proposition does not make explicit reference to its whole denotation.
3. *a*. SaP distributes its *subject*.
   b. SeP distributes both *subject and predicate*.
   c. SiP distributes *neither subject nor predicate*.
   d. SoP distributes *predicate*.
4. Mnemonic for helping to remember the facts of distribution, AsEbInOp.

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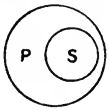
* Taken from *Picture Logic*, by Alfred Swinburne, M.A.

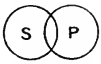
III. Euler's diagrams represent classes by circles.

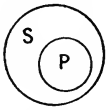
1. Five possible relations between the two classes

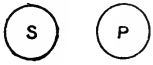
and which are represented thus:—

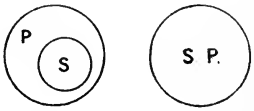
a. 

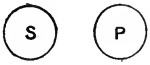
b.

c. 

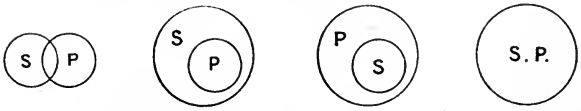
d. 

e. 

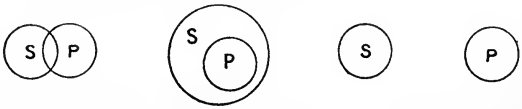
2. *a.* SaP is represented by 

b. SeP is represented by 

c. SiP is represented by



d. SoP is represented by



Questions on Chapter IX.

1. Explain the statement—"The subject of a proposition is read in denotation and the predicate in connotation."
2. What is meant by saying a term is *distributed?*
3. Show that negative propositions distribute their predicates.
4. Which terms are distributed in the following propositions. (First see that they are in logical form, then classify as A, E, I, O.)
   a. Some apples are sweet.
   b. Many students are clever.
   c. Nearly all clever and industrious students make good progress.
   d. These be none of Beauty's daughters.
   e. Honesty is the best policy.
   f. Virgil guided Dante.
5. Illustrate by Euler's diagrams all the possible relations between two classes, S and P.
6. Represent by Euler's diagrams :—
   a. Feathers are light.
   b. Glass is transparent.
   c. The penny post is a useful institution.
   d. Not all Englishmen are honest.
   e. Vain pomp and glory of this world, I hate ye.
   f. All that glitters is not gold.
8. Point out any ambiguities in :—
   a. Few birds do not fly.
   b. Every kind of fruit is not edible.
   c. All the angles of a triangle are equal to two right angles.
   d. All is not lost.

CHAPTER X.

Immediate Inference.—Opposition.

We have already seen (Chapter II.) that when a conclusion is drawn from a single premiss, the reasoning or inference is said to be *immediate*. Immediate inference makes explicit what is implicit in a single proposition. It should be at once carefully noticed that it is impossible by any form of immediate inference to evolve from a proposition what such proposition does not contain; immediate inference enables us to make clear what is involved in a given proposition.

There are two kinds of Immediate Inference, viz.—

1. Immediate Inference by *Opposition*; and
2. Immediate Inference by *Eduction*.

In this chapter we shall consider the former of these. *Opposition* is the technical term used to denote the relation existing between any two propositions which have the same subject and predicate but differ in quality, or in quantity, or in both. It should be carefully noticed that this is a somewhat different meaning from that which the word *opposition* has in ordinary discourse. Thus, technically SaP and SiP are *opposed*, though there is no incompatibility between them.

It is clear from the above definition of opposition that any one of the four propositions, SaP, SeP, SiP, SoP, is

opposed to all the others. *Immediate inference by Opposition* is an inference, from a given proposition, as to the truth or falsity of another proposition having the same subject and predicate as the given proposition. Hence the problem to be solved by *opposition* is:—granted the truth or falsity of any one of the propositions SaP, SeP, SiP, SoP, what can we know of the truth or falsity of the rest?

The opposition between
1. A and E is called *contrary*.
2. A and O, or E and I is called *contradictory*.
3. A and I, or E and O is called *subaltern*.
4. I and O is called *sub-contrary*.

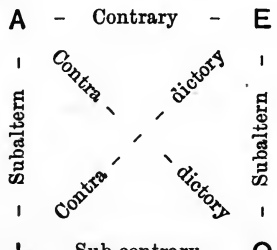
Contrary opposition, then, is the relation between two universals that differ in quality.

Sub-contrary opposition is the relation existing between two particular propositions that differ in quality.

Subaltern opposition is the relation between two propositions that differ in quantity only.

Contradictory opposition is the relation between two propositions that differ both in quality and quantity.

These various kinds of opposition can be most easily remembered by the help of the diagram known as the *square of opposition*.



This shows at a glance the name of the opposition between any one proposition and all the rest. The most important kind of opposition is the *contradictory*. What is its exact nature? What is, for example, the nature of the relation existing between the propositions—

All metals are heavy and *Some metals are not heavy.*

Clearly, if the first be true, the second cannot possibly be true, or we should have a violation of the Law of Contradiction, for in that case certain metals would be heavy and would not be heavy. Similarly, if the second be true, the first cannot be true. Hence, of two contradictories, both cannot be *true*. Can they both be *false?* Clearly not. If *all metals are heavy* is not true, then there are at least some metals of which heaviness cannot be predicated, this being the only conceivable circumstance that can make the statement, *all metals are heavy*, a false one. Therefore, if the first is false, the second is true. And similarly, if the second is false, the first is true. Hence, of two contradictories, both cannot be false. But to say of contradictories that both cannot be true and both cannot be false, is the same as saying that *one must be true and one false.* This is the characteristic of contradictory opposition, which might in fact be defined as the relation existing between two propositions, one of which must be true and one false. To *contradict* a statement is to say that such statement is *not altogether* true; if we go beyond this, and declare that the statement is *altogether false*, we are asserting the *contrary*. To disprove a universal proposition we need only establish the *contradictory*, which can be done by adducing one single instance which does not agree with the general assertion.

Thus, the proposition, *all birds fly*, may be *disproved* or *contradicted* by adducing the single case of the ostrich,

which does not fly ; for such disproof, there is no need to rush to the *contrary assertion* that *no birds fly*.

The student will easily see that of two contraries both may be *false*, but both cannot be *true*. Thus, *all birds fly*, and *no birds fly*, clearly cannot both be true, but both are, in fact, false.

If we consider the relation between I and O we see that they are in a sense contrary, for I and O differ in quality only as do A and E, but they clearly are not so contrary as are A and E, for these are *inconsistent*, whereas I and O are not. Thus

All swans are white, and *No swans are white*,

are utterly inconsistent, but *some swans are white* and *some swans are not white*, may be, and in fact are, both true. Of two sub-contrary propositions, then, both may be *true*. Can both be *false ?* Since the *contradictory* of I is E, it follows from what has been said above, that if I is false, E is true, and, clearly, if E is true, O must be true. If, then, I is false, O must be true, and similarly, if O is false, I must be true. Hence, I and O cannot both be false, but can both be true.

Of two propositions between which there is *subaltern* opposition, one, the *particular*, is called the *subaltern*, and the other, the universal, is called the *subalternant*. It is evident that the truth of the subaltern is contained in, and may be inferred from, that of the subalternant, but the truth of the subalternant cannot be inferred from that of the subaltern. Thus, if it is true that *all men are mortal*, it is evidently true that *some men are mortal ;* but, granted the truth of the latter, we should not be justified in inferring from it the truth of the former. From the proposition, *some metals float on water*, we cannot validly conclude that *all metals float on water*.

Granted the truth of SaP what immediate inferences by opposition can be made concerning the truth or falsity of SeP, SiP, and SoP?

1. The contradictory of SaP is SoP, and since two contradictories cannot both be true, from the truth of SaP we can infer the falsity of SoP.
2. The falsity of SeP, which is the contrary of SaP, may also be inferred, for two contraries cannot both be *true*.
3. The truth of SiP may be inferred, for SiP is the subaltern of SaP, and its truth is, therefore, contained in the truth of SaP.

Granted that SaP is false, we can infer—

1. The truth of its contradictory, SoP;
2. Nothing of the truth or falsity of its subaltern, SiP;
3. Nothing of the truth or falsity of its contrary, SeP.

Granted the truth of O there can be inferred—

1. The falsity of its contradictory, SaP.
2. Nothing of its sub-contrary, SiP.
3. Nothing of its subalternant, SeP.

Similarly, if SoP is false it follows—

1. That its contradictory, SaP, is true.
2. That its sub-contrary, SiP, is true.
3. That its subalternant, SeP, is false.

In the same way the student can easily obtain the inferences capable of being made by opposition from the *truth* and from the *falsity* of E and I.

The results may be collected in tabular form—

IF	A	E	I	O
SaP is true ...	t.	f.	t.	f.
SaP is false ...	f.	?	?	t.
SeP is true ...	f.	t.	f.	t.
SeP is false ...	?	f.	t.	?
SiP is true ...	?	f.	t.	?
SiP is false ...	f.	t.	f.	t.
SoP is true ...	f.	?	?	t.
SoP is false ...	t.	f.	t.	f.

In this table t, f, ?, stand for *true*, *false*, *doubtful*, respectively.

Résumé of Chapter X.

I. Immediate inference may be—
   1. By opposition or
   2. By eduction (explained in Chapter XI.).

II. *Opposition* is the relation existing between two propositions having the same subject and predicate, but differing in quality, or quantity, or both.

There are four kinds of opposition—
   1. *Contradictory*, viz., that between A and O, or E and I.
   2. *Contrary*, viz., that between A and E.
   3. *Sub-contrary*, viz., that between I and O.
   4. *Subaltern*, viz., that between A and I or E and O.

III. Immediate inference by opposition is an inference from the truth or falsity of a given proposition as to the truth or falsity of an opposed proposition. All such immediate inferences follow from the following--

1. Of two *contradictories*, one must be true and one false.
2. Of two *contraries*, both cannot be true, but both may be false.
3. Of two *sub-contraries*, both cannot be false, but both may be true.
4. The truth of the *subalternant* involves the truth of the subaltern.

IV. Contradiction is the most important logical opposition.

Exercises on Chapter X.

1. What is meant by saying that the contradictory of a proposition is an assertion that such proposition is not altogether true, and that the contrary of a proposition is an assertion that it is altogether false?
2. *a*. If I is true, what can be inferred of the truth or falsity of A, E, O?
   b. If I is false, what can be inferred of the truth or falsity of A, E, O?
   c. If O is true, what is inferrible of the truth or falsity of A, E, I?
   d. If O is false, what is inferrible of the truth or falsity of A, E, I?

3. Give the contradictories of—
   a. None but the brave deserve the fair.
   b. All quadrupeds are animals.
   c. Some stars are not suns.
   d. None of the guests have arrived.
   e. Some animals are tame.
   f. A stitch in time saves nine.
4. Give the contrary or sub-contrary of all the propositions in Question 3, and say which you give.
5. Give the subaltern or subalternant of all the propositions in Question 3, and say which you give.
6. What can be inferred by opposition from the following?
   a. All birds do not fly.
   b. Some birds do fly.
   c. All birds fly.
   d. No birds fly.

CHAPTER XI.

Immediate Inference—Eduction.

Eduction is immediate inference, from a given premiss, to the truth of another proposition in which the subject and predicate are not the same respectively as the subject and predicate of the premiss. If we have as a given premiss—

All men are mortal,

by *eduction* we may infer that—

No men are immortal ;

We can also make the inference—

Some men are mortal ;

but as the subject, *men*, and the predicate, *mortal*, are unchanged, the inference is, in this case, obtained by opposition—not by eduction.

There are various kinds of eduction, three of the most important of which, viz., *conversion*, *obversion*, and *contraposition*, we proceed to explain.

Conversion is the interchange of the subject and predicate of a proposition, such conversion being logical only when the resulting new proposition is a *valid* inference from the original proposition. The proposition which is converted is the *convertend*, the new proposition obtained by conversion is the *converse*. It is evident that in conversion both subject and predicate have to be regarded from the point of view of *denotation* ; hence, it is clearer to write P's rather

than P in the symbolic form of propositions. Thus A will, in treating of conversion, be written *all S's are P's*, rather than *all S's are P*.

Now consider the conversion of—

All S's are P's.

The converse is—

All P's are S's.

Is this the *logical* converse? Clearly not, for no valid immediate inference can give knowledge which is not implied in the premiss, and *all P's are S's* does give such knowledge, for it predicates a fact definitely of the whole of P, and the convertend, *all S's are P's*, does not do this, for the predicate is, as we have already seen, undistributed. This objection to the validity of—

All P's are S's,

as an inference from—

All S's are P's,

does not apply if we write the converse in such a form as to make the quantity of P indefinite, as it is in the convertend. We have, then, as a valid converse, the proposition—

Some P's are S's.

Two points may be noticed about this converse. In the first place, it is of the same quality (affirmative) as the convertend; secondly, the term *P's*, which is undistributed in the convertend, is undistributed in the converse.

These are the two essential points to be noticed in any case of conversion. In fact, they may be given as the two rules for conversion—

Rule I. The quality of the proposition must not be changed.

Rule II. No term may be distributed in the converse unless it is distributed in the convertend.

We may use these rules for testing the converses of E, I and O. Is *No P's are S's* the logical converse of *No S's are P's?*

Rule I. is observed, for the quality is not changed, converse and convertend being both negative. Nor is Rule II. violated, for both terms are distributed in the convertend as well as in the converse.

By applying the rules the student can easily prove that the logical converse of—

Some S's are P's, is, Some P's are S's.

The conversion of SoP presents a difficulty. If we simply interchange subject and predicate of Some S's are not P's we have as the converse Some P's are not S's. This clearly does not violate Rule I., but it does violate Rule II., for the term *S's* is distributed in the converse, being the predicate of a negative proposition, and it is undistributed in the convertend. It is, therefore, invalid. Nor can this violation be avoided, except by so altering the process that it ceases to be conversion at all. Hence, SoP has no logical converse.

These results should be remembered—

All S's are P's, or SaP, converts to *Some P's are S's, or SiP.*
No S's are P's, or SeP, converts to *No P's are S's, or SeP.*
Some S's are P's, or SiP, converts to *Some P's are S's, or SiP.*
Some S's are not P's, or SoP, is inconvertible.

In the case of E and I the converse is E and I, that is, is of the same form as the convertend, propositions being of the same form when they are of the same quality and quantity. Hence, if the converse be re-converted we obtain the convertend. Thus—

No S's are P's has as its converse
No P's are S's, and the converse of this is
No S's are P's, or the original convertend.

When this is the case the conversion is said to be *simple*.

In converting SaP we obtain as converse SiP. In this case, then, the converse is not of the same form as the convertend. If we again convert the converse we do not obtain the original convertend. The conversion in this case is said to be *per accidens*, or by *limitation*.

It should be carefully noticed that the logical converse of *all S's are P's* is always *some P's are S's*, and that this is the case even if we know that the *simple* converse *all P's are S's* is, as a matter of fact, true. Such converse is never *valid*. Thus, the logical converse of—

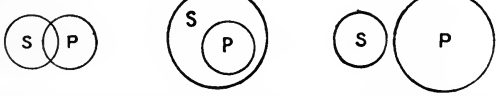
All equilateral triangles are equiangular, is
Some equiangular triangles are equilateral.

If we were to convert simply, we obtain as the converse—

All equiangular triangles are equilateral,

which is, as a matter of fact, true, but is logically invalid, as it cannot be inferred merely from the convertend.

The student should illustrate each case of conversion by means of Euler's diagrams. We will here illustrate the inconvertibility of SoP. SoP is represented by the three diagrams—



Now it is evident, to be valid, a converse must not be inconsistent with any possible case included in the convertend. If we convert SoP simply, we have *some P's are not S's*, which clearly is inconsistent with the second of the three diagrams representing SoP, and must, therefore, be an invalid inference. So any other form in which such converse can be written *as a converse* may be shown to be invalid.

Conversion is by far the most important form of eduction, and the student should make himself thoroughly understand it.

We proceed to *obversion*.

"Obversion is a process of immediate inference, in which from a given proposition we infer another, having for its predicate the contradictory of the predicate of the original proposition." (Keynes' *Logic*).

Consider the proposition—

All S's are P's.

To *obvert*, we must, according to the above definition, obtain a new proposition which shall have *non-P's* for its predicate, and which shall be inferrible from *all S's are P's*.

Clearly *no S's are non-P's* is such a proposition, which may be called the *obverse* of the original proposition, which is the *obvertend*. Three points should be noticed in this example.

1. The predicate is negatived.
2. The quality is changed, the obverse being negative, and the obvertend affirmative, and
3. The quantity is unchanged, both obverse and obvertend being universal. Hence, to obvert, we have merely to *negative the predicate, change the quality, and leave the quantity unchanged.* By applying this rule, we readily obtain the results shown in this table :—

Original Proposition or Obvertend.	Obverse.
A. All S's are P's.	E. No S's are non-P's.
E. No S's are P's.	A. All S's are non-P's.
I. Some S's are P's.	O. Some S's are not non-P's.
O. Some S's are not P's.	I. Some S's are non-P's.

The following are concrete examples of obversion:

A. All birds are bipeds.	Obvertend.
E. No birds are non-bipeds.	Obverse.
E. No Europeans are Hottentots.	Obvertend.
A. All Europeans are non-Hottentots.	Obverse.
I. Some apples are sweet.	Obvertend.
O. Some apples are not non-sweet.	Obverse.
O. Some men are not honest.	Obvertend.
I. Some men are non-honest.	Obverse.

Care is needed in negativing the predicate. If to the predicate of the obvertend there is an exact negative this can be used; thus, since *immortal* is the negative of *mortal*, we give—

No men are immortal,

as the obverse of—

All men are mortal.

More frequently than not, however, there is no exact negative term of the predicate of the obvertend, and whenever this is the case the negative should be formed by prefixing non- to the predicate term of the obvertend. Thus we must write the obverse of—

All apples are sweet, in the form

No apples are non-sweet.

The student might at first think that the obverse is—

No apples are sour,

reference to the definition of obversion as given above will, however, make it clear that it is not, for *sour* is not the *negative* but the *opposite* of sweet.

The last form of eduction that we have to consider is, *Contraposition*. Dr. Keynes defines contraposition as "A process of immediate inference in which, from a given

proposition, we infer another proposition, having the contradictory of the original predicate for its subject, and the original subject for its predicate."

If we *obvert* the proposition—

All S's are P's, we obtain

No S's are non-P's, as its obverse.

Now by *converting* this obverse we have—

No non-P's are S's,

and this is a proposition obtained by inference from—

All S's are P's,

and which has for its subject the contradictory of the predicate of the original proposition, and for its predicate the subject of the original proposition. Hence, according to the above definition, the whole inference must be a case of contraposition. The resulting proposition may be called the *contrapositive* of the original proposition, which *contrapositive* may, indeed, be defined as the *converse* of the *obverse*. The rule for contrapositing, then, is plain, *viz.*, *obvert and convert the obverse.*

The contrapositive of All S's are P's is, as we have just seen—

No non-P's are S's.

What is the contrapositive of E, *No S's are P's*?

The *obverse* is All S's are non-P's, and the *converse* of this is—

Some non-P's are S's,

which is therefore the *contrapositive* of—

No S's are P's.

If we attempt to contraposit I, *Some S's are P's*, we are met with a difficulty, for on obverting we obtain—

Some S's are not non-P's,

and this, being SoP, is incapable of conversion. Hence, no contrapositive can be obtained from an I proposition.

If we obvert O, Some S's are not P's, we obtain—

Some S's are non-P's,

the converse of which is

Some non-P's are S's,

which is therefore the contrapositive of

Some S's are not P's.

Our results may be tabulated thus—

Original Proposition.	Obverse.	Contrapositive.
SaP All S's are P's.	SeP No S's are non-P's.	SeP No non-P's are S's.
SeP No S's are P's.	SaP All S's are non-P's.	SiP Some non-P's are S's.
SiP Some S's are P's.	SoP Some S's are not non-P's	None.
SoP Some S's are not P's.	SiP Some S's are non-P's.	SiP Some non-P's are S's.

The following are concrete examples of contrapositives—

A. All Hottentots are Africans, Original proposition.
E. No non-Africans are Hottentots. Contrapositive.

E. No birds are quadrupeds. Original proposition.
A. All quadrupeds are non-birds. Contrapositive.

O. Some men are not honest. Original proposition.
I. Some non-honest beings are men. Contrapositive.

The student should illustrate contraposition by Euler's diagrams.

Résumé of Chapter XI.

I. *Eduction.*

1. Definition—Immediate inference from a given proposition to the truth of a new proposition, which differs in subject or predicate, or both, from the original proposition.
2. Example—*No men are immortal,* is an eduction from *all men are mortal.*
3. Kinds discussed—
   a. Conversion.
   b. Obversion.
   c. Contraposition.

II. *Conversion.*

1. Definitions—
   a. Conversion—the valid interchange of the subject and predicate of a proposition.
   b. The *convertend* is the proposition to be converted.
   c. The *converse* is the new proposition obtained by conversion.
   d. Conversion is *simple* when the converse is of the same form as the convertend.
   e. Conversion is *per accidens* when the converse is not of the same form as the convertend.
2. Rules for Conversion—
   a. Leave the quality unchanged.
   b. See that no term is distributed in the converse, unless it is distributed in the convertend.

3. Examples of Conversion—

a. A, *All S's are P's*, converts *per accidens* to I, *some P's are S's.*

b. E, *No S's are P's*, converts *simply* to E, *no P's are S's.*

c. I, *Some S's are P's*, converts *simply* to I, *some P's are S's.*

d. O, *Some S's are not P's*, is incapable of conversion.

III. *Obversion.*

1. Definitions—

a. Obversion is the inference, from a given proposition, of a new proposition, the predicate of which is the contradictory of the predicate of the original proposition.

b. The proposition to be obverted is the *obvertend.*

c. The proposition obtained by obverting is the *obverse.*

2. Rule for Obversion—Negative the predicate, change the quality and leave the quantity unaltered.

3. Types of Obversions—

a. A, *All S's are P's*, obverts to E, *no S's are non-P's.*

b. E, *No S's are P's*, obverts to A, *all S's are non-P's.*

c. I, *Some S's are P's*, obverts to O, *some S's are not non-P's.*

d. O, *Some S's are not P's*, obverts to I, *some S's are non-P's*

IV. *Contraposition.*

1. Definitions—
   a. Contraposition is the conversion of the obverse.
   b. The proposition obtained by contraposition is called the *contrapositive.*
2. Rule for contraposition :—*Obvert, and convert the obverse.*
3. Types of contraposition—
   a. A, *All S's are P's,* contraposits to E, *no non-P's are S's.*
   b. E, *No S's are P's,* contraposits to A, *all S's are non-P's.*
   c. I, *Some S's are P's,* is incapable of contraposition.
   d. O, *Some S's are not P's,* contraposits to I, *some non-P's are S's.*

Exercises on Chapter XI.

1. Distinguish between eduction and immediate inference by opposition.
2. Convert—
   a. Some stars are self-luminous.
   b. Some metals are not so heavy as water.
   c. All Europeans are white.
   d. All minerals are dug out of the earth.
   e. P struck Q.
   f. All that glitters is not gold.
3. Contraposit the above where possible.
4. Obvert the propositions in Question 2.
5. Illustrate the conversion of SaP, SeP, and SiP by Euler's diagrams.

6. Illustrate the contraposition of SaP by means of Euler's diagrams.
7. All equilateral triangles are equiangular. What can be inferred from this by conversion, by obversion, and by contraposition ?
8. What kinds of inferences are the following ? Say whether they are valid or not.
   a. Our knowledge must be gained from books, for books are a source of instruction.
   b. All triangles are trilateral, therefore, all trilateral figures are triangles.
   c. All that glitters is not gold, therefore, gold does not glitter.
   d. All wise students study hard, therefore, none who do not study hard are wise students.
   e. A met B, therefore, B met A.
9. Explain clearly why SiP cannot be contraposited.
10. Convert, obvert, and contraposit—
    Things which are equal to the same thing are equal to one another.

CHAPTER XII.

The Predicables.

In the last two chapters we have considered the most important relations existing between different propositions having the same or closely connected subjects and predicates; we have now to consider the different possible relations between the predicate and subject of the same proposition. The different classes into which predicates may be arranged by considering the relation in which they stand to their subjects, are known as the *predicables*. In every proposition something is affirmed or denied of the subject; what is so affirmed or denied is a *predicate*, what can be so affirmed or denied is a *predicable*. Aristotle (B.C. 384—322) arranged the predicables into *four* classes. His scheme has, however, completely given place to that of Porphyry (A.D. 234 to 304), who arranged the predicables under five heads.

In Porphyry's arrangement—

The Predicables are	1. Genus	Genus*
	2. Species	Species
	3. Difference, or	Differentia
	4. Property	Proprium
	5. Accident	Accidens.

* Singular, genus, species, differentia, proprium, accidens. Plural, genera, species, differentiæ, propria, accidentia.

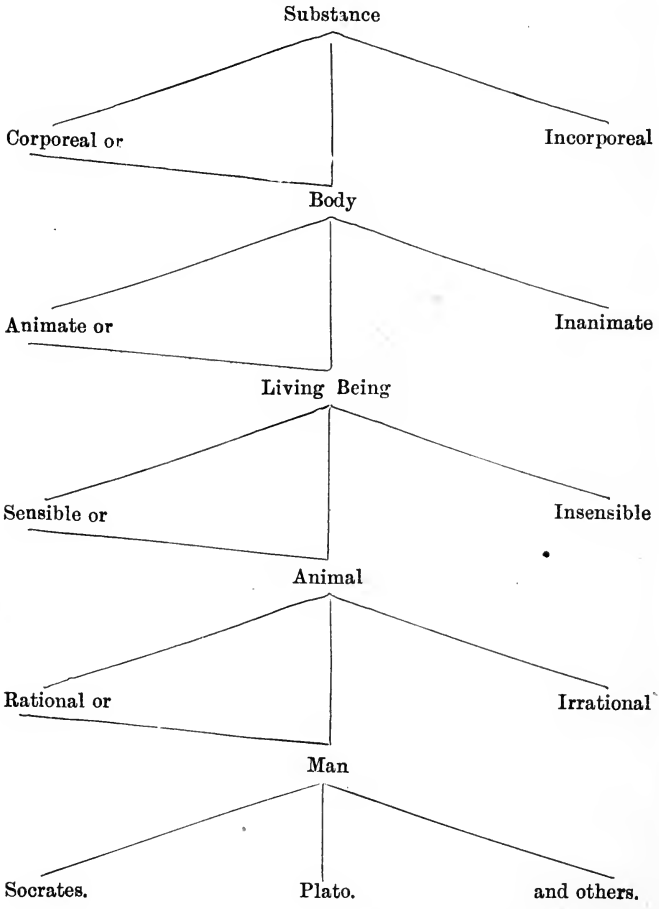
The second column gives the Latin names of the predicables. These are often used and should therefore be carefully remembered.

Any class regarded as consisting of two or more smaller classes is a *genus;* and the smaller classes which together constitute the *genus* are *species.* Thus, *triangle* is a *genus*, the *species* of which are scalene triangle, isosceles triangle, and equilateral triangle. In the proposition, *apples are fruit*, the predicate *fruit* is a *genus*, in relation to the subject *apples*, which is a *species*, in relation to the predicate *fruit.*

The term predicable itself is the name of a *genus*, the *species* of which are, *genus*, *species*, *difference*, *property* and *accident.* It is clear that *genus* and *species* are relative, for the definition of either involves that of the other; each is intelligible only in its relation to the other. It must be carefully noticed that the same term may at one time be the name of a genus and at another the name of a species, for whether a class is a genus or species depends entirely upon how we regard such class; regarded as a class consisting of sub-classes it is a genus, but regarded as a sub-class of a larger class it is a species. Thus, in *apples are fruit*, apples are a *species* of the *genus* fruit; but in *golden russets are apples*, the class *apples* is a genus, one species of which is *golden russets.*

A class which cannot be divided into sub-classes, but only into individuals, is called a *lowest species* or *species infima*; a *genus* which cannot be regarded as a species of any larger class is a *highest genus* or *summum genus.* Every genus must, of course, contain at least two species. All the species which together constitute the genus, are said to be *cognate.*

Any genus, with reference to the species into which it is immediately divided, is called a *proximate genus*. The following table was given by Porphyry to illustrate the connection between *genus* and *species*, and is consequently known as the Tree of Porphyry.



Here *substance* being regarded as a class including all other classes, and included in no other class, is the *summum genus; Man* being divided not into sub-classes, but into individuals, is the *species infima. Corporeal substance, or body*, and *incorporeal substance*, are *cognate* species of the *proximate* genus substance. So the *proximate genus* of rational animal and irrational animal is *animal.* Since the genus is a class consisting of smaller classes or species, the denotation of the name of the genus, or generic term, is greater than that of the name of the species, or specific term, and hence its connotation is less. Thus, *rational animal* is the name of a species of the genus *animal;* and, clearly, *animal* has greater denotation than *rational animal*, and has less connotation, for *rational animal* connotes all that *animal* does, and, in addition, it connotes the attribute of *rationality.* In fact, it is this additional connotation of the specific term that determines whether or not anything belonging to the genus belongs also to the species. It serves to differentiate the species from all other cognate species. This excess of connotation of the specific term over that of the generic term is the *differentia*, the third of the predicables. It is clear, then, that the connotation of the specific term equals the connotation of the generic term, together with the *difference.* If we remember that the terms are used with reference to connotation, this may be expressed thus :—

Species-name = genus-name + differentia.

Thus :—

Rational animal or species-name	=	animal or genus-name	+	rational or difference.

The word *differentia*, it will be noticed, is also a purely relative term, having no meaning apart from *genus* and *species*.

It may be useful to notice that the *genus* answers the question: What? The species: What kind? For example; what is a triangle? A figure (the genus). What kind of figure? One bounded by three lines (the species). A *proprium*, or *property*, is an attribute common to every member of a class which forms no part of the connotation of the class-name, but follows as a necessary consequence from it. For example, it follows as a necessary consequence from the connotation of *equilateral triangle*, as given in its definition, that an equilateral triangle is equiangular. *Equiangularity* is, then, a property of equilateral triangles. Similarly, the attribute of having the sum of its angles equal to two right angles is a *property* of triangles, for it forms no part of the connotation of *triangle*, but can be logically deduced from it.

Clearly, then, a property is an essential property in the sense that it is, and must be, possessed by every member of the class included under the class-name.

An *accidens* is a quality which forms no part of the connotation of the class-name, and cannot be deduced from it. It is not an essential quality, for its presence or absence in an object in no way affects the position of such object in the class. Thus, that the table at which I am writing is square is *an accident*, as is also the fact that it is made of mahogany. Both these qualities might be absent without the table ceasing to be a table.

Accidentia may be *separable* or *inseparable*.

A *separable* accident is one that does not belong to every individual of a class. Thus, whiteness is an *accident* of some swans, but a *separable* accident, for some swans are not white.

An *inseparable* accident is one that belongs to the whole class. Thus, it is an inseparable accident of pianos that some of their keys are black.

Résumé of Chapter XII.

Predicables.

I. Definitions.

1. A *predicate* is something affirmed or denied of a subject.
2. A *predicable* is whatever can be affirmed or denied of a subject.

II. Names of Predicables.

1. *Genus* is any class regarded as divided into two or more sub-classes.
2. *Species* is one of the sub-classes into which the genus is regarded as divided.
3. The *difference* (Latin *differentia*) is the excess of connotation of the name of the species over that of the name of the genus.
4. A *property* (Latin *proprium*) is an essential quality which forms no part of the connotation of the class-name, but is deducible from it.
5. An *accident* (Latin *accidens*) is any quality having no connection with the connotation of the class-name.

Exercises on Chapter XII.

1. Give six examples of species, mentioning in each case the proximate genus.
2. The species is part of the genus, and the genus is part of the species. Explain how this can be.
3. Refer the following predicates to their proper predicable—
   a. The horse is a quadruped.
   b. Socrates is a man.
   c. An equilateral triangle is bound by three equal sides.
   d. The angle in a semi-circle is a right angle.
   e. Some men are six feet high.
4. Give the proximate genera of those of the following which may be regarded as species—
   Man, teacher, Julius Cæsar, city, violin, table.
5. Specific name = Generic name + differentia. Explain this.
6. Is *laughter* a property or accident of man?

CHAPTER XIII.

Definition.

One of the most prolific sources of error in reasoning is the use of terms without there being in the mind of the speaker any definite idea of the connotation of such terms. We think we have an accurate knowledge of the language we use, but a very slight examination will convince most of us that such is not the case. When the student uses or hears used such familiar terms as *freedom*, *slavery*, *education*, *constitutional*, *honourable*, *definition*, let him but ask himself what their exact meaning is, and he will quickly discover that in many cases his ideas of their meaning are too vague to be put into words. Even in cases where the meaning is apparently perfectly known, it is frequently a matter of great difficulty to accurately express such meaning in words. Every general term has a certain connotation, and we should never rest satisfied with our knowledge of this connotation until we can accurately express it in words, that is, until we can *define the term*.

A *definition* is a proposition which gives the connotation of a term. Note carefully that definitions are of *terms*, not of *things*. By *connotation of a term*, it will be remembered, is meant those attributes, and those only, which must be possessed by an object before such term can rightly be applied to it. Thus, in *man is a rational animal*, we have a proposition setting forth the connotation of man, viz.,

the attribute implied by the term *animal*, together with *rationality*. If a term changes in meaning, as is frequently the case, then, of course, its definition also changes. Further, since a definition is an expression of the connotation of a term, it is evident *non-connotative* terms cannot be defined, for they have no connotation. We have already seen that proper names and singular abstract terms are non-connotative, and they, therefore, do not admit of definition.

The connotation of many terms is exceedingly complex, and a definition setting forth such connotation in simple attributes would be excessively unwieldy. Hence, a definition generally gives the greater part of the connotation by using a term expressive of a group of attributes, the meaning of such term being, of course, supposed to be known. Thus, if we define a *barrister* as a *lawyer who pleads at the bar*, all the connotation of *barrister*, with the exception of *pleading at the bar*, is given in the term *lawyer*. *Barrister* may be regarded as a species of the genus *lawyer*, and as we have already seen—

Connotation of species-name = connotation of genus-name + difference.

The above may be written thus—

Connotation of *barrister* = connotation of lawyer + pleading at the bar.

Hence, the term barrister is defined by giving the *proximate genus* (lawyer), and adding the *difference* (*pleading at the bar*). In defining, it is always best to proceed in accordance with the old rule that definition should be *per genus et differentiam*, *i.e.*, by means of the *genus* and the *difference*. Hence, if we wish to define any term, the first thing to do is to determine the class (genus) to which it belongs, and then add the difference.

The following are the rules usually given, to be observed in framing a definition—

1. The definition must contain neither more nor less than the connotation of the term defined.
2. It should be more intelligible than the term defined, and must not, therefore, be expressed in language the meaning of which is, from any cause, obscure.
3. It must not contain the term defined, nor any term synonymous with it.
4. It should not be negative if it can be affirmative.

To these may be added the old rule given above, *viz.*,

5. All definitions should be *per genus et differentiam.*

Rule 1 is not of much service in framing a definition. It is rather a test to be applied to the definition after it has been made. If more connotation be given than the term possesses, the definition is said to be too *narrow*, for it will not apply to all things bearing the name defined. Thus, if the term monarch is defined as a "man having supreme power in a country," such definition gives too much connotation, for it sets forth *sex*, which is no part of the connotation of monarch; it is, therefore, too *narrow*, as it excludes *women* who are monarchs.

The rule may be violated by giving too little, as well as by giving too much, connotation, in which case the definition is too *wide*, for it includes more *things* than rightly form the denotation of the term defined. Thus, if we were to define *hat* as *clothing for the head*, our definition would be too wide, for *clothing for the head* includes caps, turbans, bonnets, etc., as well as *hats*.

This rule is a very difficult one to avoid violating. It is often almost impossible to say precisely what the connotation of a term is, and especially is this the case if

the term is the name of a common object. To define may seem to be easy enough, but let the student try to frame accurate definitions of such common terms as *table*, *stool*, *chair*, *desk*, *hat*, *carriage*, and he will at once discover how difficult it is to avoid breaking the very first rule of logical definition.

The student should notice carefully that a definition gives *connotation*; if *properties*, or *accidents*, or both, are given, we have a *description* and not a *definition*.

Rule 2.—The reason for this rule is obvious. If connotation be given in terms less intelligible than the term defined, one object of the definition is defeated, for the meaning of the term is not made clearer by such a definition. Thus one's knowledge of the meaning of *soul* is not much improved by Aristotle's definition of it as "the first *entelecheia* of a natural body which has potential life". *Fluency* might be defined as the *exuberance of verbosity*, but such definition would hardly make clearer one's idea of fluency.

When this rule is violated the definition is said to define the *obscure* by the *more obscure (obscurum per obscurius)*, or the *unknown* by the *more unknown (ignotum per ignotius)*. This rule is also violated by the employment of metaphors in defining; thus, it is no definition of bread to say that it is the *staff of life*.

Rule 3.—The violation of this rule gives rise to what is known as a circle in defining (*circulus in definiendo*). Thus, if we define a metal as *one of the metallic elements*, we make no advance in knowledge, but rather travel in a circle and return to the place whence we started; if we do not know what a *metal* is neither do we know what *metallic* is. To define *life* as the *sum of the vital functions* is to commit

the same fault, for the word *vital* is from the Latin, *vitalis*, which, again, is from *vita*, the Latin word for *life*. Definitions in English are especially liable to this fault, as it frequently happens that a pure English word has a corresponding synonym derived from Latin.

Rule 4.—The definition of a purely negative term is naturally, negative. Thus, *alien* is a negative term, and its definition, which may be given as *one who does not belong to the British Empire*, is also negative.

Résumé of Chapter XIII.

I. Definitions are necessary—
   1. To make clear the meaning of terms.
   2. To fix such meanings.

II. Definitions.
   1. *Definition:*—A proposition setting forth the connotation of a term.
   2. Rules for defining.
      a. The definition must contain neither more nor less than the connotation of the term defined.
      b. It must be more intelligible than the term defined.
      c. It must not contain the term defined.
      d. It should be affirmative whenever possible.
      e. It should be *per genus et differentiam.*
   3. *Non-connotative* terms are incapable of being defined.

Exercises on Chapter XIII.

1. What is a definition ?
2. What is the difference between a *definition* and a *description* ?
3. What is meant by definition *per genus et differentiam* ? Give examples.
4. Which of the following terms cannot be defined and why ? School, college, honesty, Cæsar, horse, England.
5. Define the terms capable of definition in Question 4.
6. Criticise the following definitions taken from an English Dictionary—
   a. An auditor is one who audits accounts.
   b. An atlas is a collection of maps.
   c. A net is a reticulated fabric decussated at regular intervals.
   d. A burgess is an inhabitant of a borough.
   e. An apple is the fruit of the apple tree.
   f. An alley is a place along which one may go.

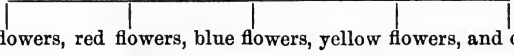
CHAPTER XIV.

Logical Division.

Logical Division is closely connected with definition, bearing as it does, much the same relation to the *denotation* of a term that definition does to the *connotation*. As to *define* is to unfold connotation, so to *divide* is to unfold, or analyse in an orderly way, denotation. It is called *division*, for an orderly analysis of the denotation of a term can be made only by regarding the term as the name of a genus, and by dividing such genus into its constituent species. The genus to be divided is called the *totum divisum*, or *total divided*, and the species or sub-classes into which it is divided, the *membra dividentia*, or *dividing members*.

Thus, if the genus *animal* be divided into the two species *rational animal* and *irrational animal*, *animal* is the *totum divisum*, and *rational animal* and *irrational animal*, the *membra dividentia*.

Before any class can be divided into sub-classes, some attribute or attributes must be thought of, on the presence, or absence, or the varying degree, of which the division may be made to depend. Thus, if I wish to divide the genus *flowers*, I first think of some attribute, *e.g.*, colour, variation of which will enable me to divide *flowers* into species.



Here *flowers* is the *totum divisum*, *white flowers*, *etc.*, are the *membra dividentia*, and *colour* is the attribute on which the division is based, or the *fundamentum divisionis*, as it is technically named.

If *plants* be divided into flowering-plants and non-flowering plants the *fundamentum divisionis* is the attribute *flower-producing*, the presence or absence of which serves as a basis of the division.

In the chapter on the *predicables* we have already seen that the species of any genus may themselves become genera for further division, which is then called *sub-division*. It is clear that for each step in the sub-division we shall require a fresh *fundamentum divisionis*. Thus, after having divided the genus *books* into the species *English books*, *French books*, etc., we may regard *English books* as a genus to be further divided into *species*, but we can no longer divide on the basis of the language in which printed, for all are printed in English ; a fresh *fundamentum divisionis* is needed, *e.g.*, size. We can then divide the genus *English books* into *English quarto books*, *English octavo books*, and so on.

There are certain processes to which the name *division* is applied, which should be carefully distinguished from *logical division*. *Physical division*, or *physical partition*, is a division of a unit into the parts of which such unit is formed, as, for instance, an individual house may be divided into the bricks, mortar, wood, etc., of which it is built. Another form of division is what is properly called *metaphysical division*, which by *abstraction* divides an individual object into the

qualities of which it may be said to consist. Thus, an orange may be regarded as an object consisting of a collection of qualities, such as yellow colour, a certain shape, a certain taste, etc. Logical division differs from both these in being applied to *classes* only, and not to *individuals*.

Certain rules have been given for carrying out a logical division; they are the following:—

1. Each step in the division must be founded upon one *fundamentum divisionis*.
2. The species when added together must equal the *proximate genus*.
3. The division must be gradual.

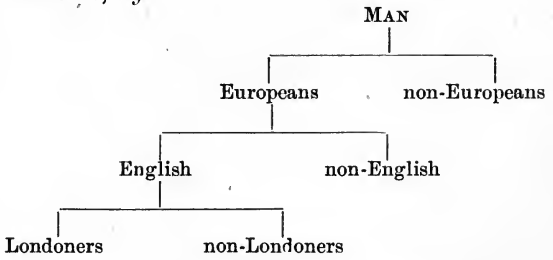
Rule 1.—The necessity for observing this is evident. If in dividing the genus *books* we choose size and subject matter as two *fundamenta divisionis*, we shall have two places in our division for each individual book. Where, for instance, shall we put an octavo book on Logic? Shall we put it in the *octavo class*, where it ought to go in virtue of its size, or in the class of Logic books, where it should go in virtue of its subject matter? We have what is called a *cross division*, which may be defined as the faulty form of division that results from its being based on more than one *fundamentum divisionis*.

The one *fundamentum divisionis* applies of course only to the *cognate* species. Every successive step in the division must have a fresh *fundamentum divisionis*. Thus, in dividing books according to subject matter, we should have as one of the cognate species *music books*. If now we regard this as a genus to be further divided, clearly we must have a fresh *fundamentum divisionis*, *e.g.*, size, in which case our division would result in *folio music books*, *quarto music books*, etc., as cognate species.

Rule 2.—If the sum of the cognate species be less than the genus, some part of the latter remains undivided, and the division is therefore not complete; and if it be greater we must have some things included in the species which do not belong to the genus at all. This rule does not help us much; it merely says that in dividing we should be careful to leave none of the *totum divisum* undivided.

Rule 3.—The old logicians gave this rule in the words *divisio non faciat saltum*, that is, *the division must not make a leap*. This rule will be kept if we always take care to make the species those of the proximate or next higher genus. Thus, it would be illogical to divide Europe at once into *parishes*; the proximate genus of *parish* might possibly be *union*, *barony*, or *county*, but is certainly not Europe.

The most perfect form of logical division is that in which at each step the genus is divided into two species, one species having a certain attribute and the other not possessing such attribute, *e.g.*—



Such a division is said to be by *Dichotomy*, from two Greek words meaning "a division into two."

In division by dichotomy cross division is impossible, for an object cannot both possess an attribute and not possess it, which it must do to belong to both the cognate species. Moreover, every object in the genus to be divided must, by

the Law of Excluded Middle, either possess any given attribute or not possess it, and hence every object will have its place in one or the other of the cognate species. Therefore, the second of the above rules will not be broken in a division by dichotomy if carefully carried out.

Division by dichotomy is, in many cases, however, too tedious. When we are certain of the number of the subclasses it is better to divide the genus into such classes at once. It would be absurd to divide England into Middlesex and non-Middlesex, as cognate species; and then non-Middlesex into Surrey and non-Surrey, and so on. Since the number of counties is known, the rules may be kept by dividing at one step into counties.

The Tree of Porphyry given in the lesson on the predicables is a good example of logical division by dichotomy.

Résumé of Chapter XIV.

Division.

I. *Definitions.*

1. Logical division is an orderly analysis of the denotation of a term.
2. *Totum divisum* is the whole class to be divided.
3. *Membra dividentia* are the sub-classes in the division.
4. *Fundamentum divisionis* is the attribute, the presence or absence or varying degree of which determines the class of any object.

II. Processes to be distinguished from logical division.

1. *Physical division* is the division of an individual object into its material elements.

2. *Metaphysical division* is the division by abstraction of an individual object into the qualities which may be regarded as constituting it.

III. Rules for logical division.

1. Each step in the division must be founded on one *fundamentum divisionis.*
2. The species when added together must equal the proximate genus.
3. The division must be gradual.

IV. Division by dichotomy is that form of division in which each genus is divided into *two* species determined by the presence or absence of some attribute.

Exercises on Chapter XIV.

1. What is logical division?
2. Distinguish *logical* division from *physical* division, and from *metaphysical* division.
3. Explain *fundamentum divisionis.*
4. Divide book, teacher, school.
5. Criticise the following divisions—
   a. Books into folio, quarto, octavo, French and English.
   b. Quadrupeds into horses, ponies, mules, carnivora, and mammalia.
   c. Knowledge into useful, useless and harmful.
   d. Thieves into pickpockets, pilferers, highwaymen and pirates.
   e. Pictures into sacred, historical, imaginative, and realistic.
   f. Constitutions into good and bad.

CHAPTER XV.

The Syllogism.

We have already (Chapter IV.) seen what constitutes a syllogism. We have in the present chapter to consider under what circumstances we may rely on the conclusion of a syllogistic argument as being valid.

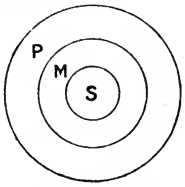
A syllogism has been defined as "a reasoning, consisting of three categorical propositions (of which one is the conclusion), and containing three, and only three, terms" (Keynes). Taking this as our definition of the syllogism, we see that every syllogism consists of three propositions, and contains three terms. These terms are the *middle term*, the *major term*, and the *minor term*. These have been already defined (Chapter IV.) and the student, if he has not already done so, must firmly fix in his mind that the *middle term* is the one which does not occur in the conclusion, that the *major term* is the predicate of the conclusion, and the *minor term* the subject of the conclusion. Consider the syllogism—

All M's are P,
All S's are M,
therefore All S's are P.

Here the proposition written last is the *conclusion*, for it is clearly the inference drawn from the other two, which are the *premisses*,

The three terms are S, M, P, each of which occurs twice. M is the middle term, for it is the term which does not occur in the conclusion; S is the minor term, being the subject of the conclusion; and P is the major term, being the predicate of the conclusion.

A syllogism like the above may be typically represented by the Eulerian diagrams, thus—



In this, for the sake of simplicity, only one diagram is used to represent SaP. According to this diagram S stands for a class *smaller* than the M class, P stands for a class *larger* than the M class, M denoting a class intermediate in size between the classes denoted by S and P. It is for this reason that they received the names, *minor*, *major* and *middle* respectively. These names are, however, used in the technical sense defined above, for the mutual relation implied by the names *minor*, *major* and *middle* does not always hold.

The premiss containing the *minor* term is called the *minor premiss*, and that containing the *major* term is called the *major premiss*. In the strict logical order of the syllogism the major premiss stands first, the minor second, and of course the conclusion last. This order is, however, in practice by no means always observed. Frequently the conclusion stands first as in the syllogism—

He is honest	(conclusion)
For he is an Englishman	(minor premiss)
and All Englishmen are honest	(major premiss)

The student should now be in a position to understand the rules of the syllogism. As usually given they are six in number, to which are added three additional ones deducible as corollaries from them.

The rules are—

1. Every syllogism contains three, and only three, terms.
2. Every syllogism consists of three, and only three, propositions.
3. The middle term must be distributed once at least, and must not be ambiguous.
4. No term may be distributed in the conclusion which was not distributed in one of the premisses.
5. From negative premisses nothing can be inferred.
6. If one premiss be negative, the conclusion must be negative, and conversely, to prove a negative conclusion one premiss must be negative.

The three supplementary rules deducible as corollaries from the above, are—

7. From two particular premisses, nothing can be inferred.
8. If one premiss be particular, the conclusion will be also particular.
9. From a particular major and a negative minor premiss, nothing can be inferred.

These rules are of such supreme importance, that they should be learned thoroughly at once. If any complete thought, when put into syllogistic form, is found not to violate any of these rules, the conclusion must necessarily be valid. Rules 1 and 2 are very important as a means of testing any given argument as to whether it is a syllogism or not; they are, however, of little or no practical use as tests of the validity of the syllogism.

The first part of Rule 3 is exceedingly important, and is constantly being violated by students who have not studied Logic. One of the commonest experiences of the teacher of Logic is, after having explained what a syllogism is, to have given him, as valid syllogisms, examples of syllogisms which violate Rule 3. Here are a few actually given by students—

All flowers are pretty,
All roses are pretty,
therefore All roses are flowers.

All children are playful,
Tommy is playful,
therefore Tommy is a child.

All quadrupeds are animals,
The horse is an animal,
therefore The horse is a quadruped.

In the first of these the middle term is *pretty*, and this is the predicate of both premisses, which are affirmative; it is therefore undistributed. When any rule of the syllogism is violated, a *fallacy* is said to be committed; in this case we have the *fallacy of the undistributed middle term*, or more briefly, the *undistributed middle*. Similarly, in both the second and third of the above syllogisms we have the fallacy of the undistributed middle. The student will now readily understand why the fourth syllogism given in Chapter II. is invalid. It is—

All coins are useful things,
All shillings are useful things,
therefore All shillings are coins.

The middle term *useful things* is not distributed in either premiss of the syllogism which, therefore, is guilty of the undistributed middle.

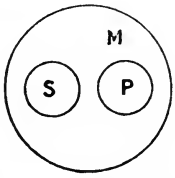
In all the above examples the conclusions are *true* and it is this which is so likely to mislead the student into thinking that they are valid. Express any of them in symbols and the fallacy is more apparent. Thus for "coins", "useful things", "shillings", the major, middle and minor terms respectively, put P, M, S, respectively.

The syllogism now is—

All P's are M,
All S's are M,
therefore All S's are P.

It is at once evident that it contains the undistributed middle.

This fallacy may be clearly illustrated by Euler's diagrams. The diagram—



clearly satisfies the premisses and is yet inconsistent with the conclusion of the syllogism, which is therefore invalid, for, in a valid syllogism, if the premisses are true the conclusion is also necessarily true.

The second part of Rule 3 is also important. It is easy for any one who has once understood what is meant by the *undistributed middle term* to avoid the violation of the first part of this third rule, but it is a much more difficult matter to avoid violating the second part of this rule. The violation of the second part of the third rule of the syllogism is known as the *fallacy of the ambiguous middle.*

A term is said to be ambiguous when in different parts of the same argument it has different meanings. Thus, in the syllogism—

Light dispels darkness ;
Feathers are light ;
therefore Feathers dispel darkness.

The term *light* has, evidently, two meanings, and is, therefore, *ambiguous.* Moreover, *light* is the middle term in the above syllogism, hence, the syllogism is invalid, containing the fallacy of the ambiguous *middle term.* In this case the ambiguity is easy enough to detect, and the student may think that the ambiguous middle can always easily be avoided. There is no fallacy that is more abstruse and more difficult to avoid falling into. Let the student try to discover the fallacy in the following syllogism, and he will at once see that the fallacy of ambiguous middle is not always easily detected—

A man deserves no credit for doing what he cannot possibly help doing ;
A benevolent man cannot possibly help relieving distress ;
therefore A benevolent man deserves no credit for relieving distress.

If we carefully examine the precise meanings of the terms we see that "cannot possibly help" is used in different senses in the two premisses. These words, moreover, form part of the middle term, hence, the above syllogism is guilty of the fallacy of *ambiguous middle term.*

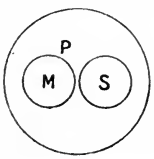
When a term is used in the same argument in two senses it is in reality *two terms* which happen to be spelled and pronounced alike, so that a syllogism containing an ambiguous middle term has really four terms and thus

violates the first rule. Every case of the fallacy of ambiguous middle may be regarded as a case of the *fallacy of four terms.*

The fourth rule of the syllogism is also an important one. The student will find no difficulty in detecting any cases of its violation. Consider the syllogism—

All M's are P,
No S's are M,
therefore No S's are P.

The major premiss in this is an A proposition and its predicate, which is the *major* term, is therefore undistributed; the conclusion, being an E proposition, distributes its predicate, which is the major term. Hence, the *major* term is distributed in the conclusion, but not in the major premiss, and the syllogism therefore violates the fourth rule. This is an example of the fallacy known as the *illicit process of the major term*, or more shortly, the *illicit major*. The above syllogism may be represented by the diagram—



which is in accordance with the premisses, but inconsistent with the conclusion. A concrete example of the *illicit major* is—

All apples are fruit,
No pears are apples,
therefore No pears are fruit.

The *invalidity* of the conclusion is, in this, at once noticed, because it is seen to be false. If however, we

have a syllogism guilty of the same fallacy, but having a conclusion known to be true, the fallacy is much more likely to be overlooked. Thus, the syllogism—

All Hottentots are Africans,
No English are Hottentots,
therefore No English are Africans,

is invalid, from its violating rule 4, although, knowing the *truth* of the conclusion, we are apt to conclude that it is valid.

Similarly we may have an *illicit process of the minor term*. Thus the syllogism—

All M's are P,
Some S's are M,
therefore All S's are P,

clearly has the minor term S undistributed in the minor premiss and distributed in the conclusion. The *illicit minor* is less frequent and more easily detected than the *illicit major*. A concrete example is—

All rogues deserve punishment
Some Englishmen are rogues,
therefore All Englishmen deserve punishment.

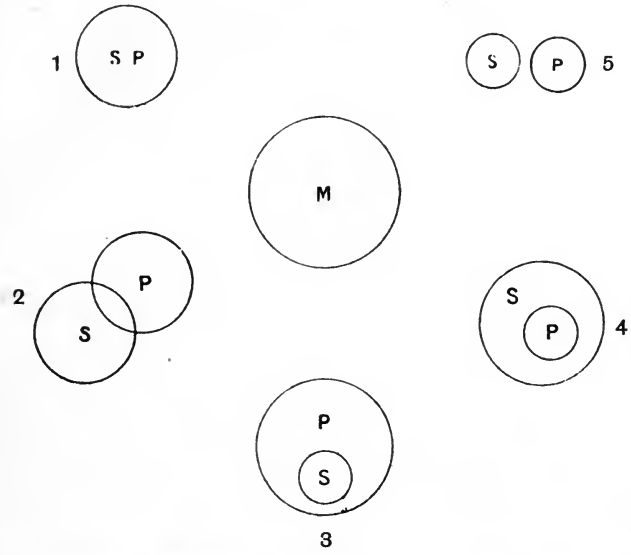
Rules 3 and 4 are the only ones that give any difficulty in applying. To be able to apply these two rules the student must have perfectly clear ideas on the subject of distribution of terms.

Rule 5 may be clearly illustrated by diagrams. To represent the premisses—

No P's are M,
and No S's are M,

we must be careful to make both the P circle and the S circle outside of the M circle, but the premisses give us no conditions as to the relation of S and P. In fact, the S and

P circles may have any one of the five relations possible between them. This may be shown thus—



the premisses allowing of all the five relations between S and P shown. Hence, we can no more make any inference from the premisses than from the mere mention of the terms S and P. If this is the case with *universal premisses*, still more so is it the case with *particular premisses*.

Rule 6. If one premiss is negative, the other must be positive, by Rule 5. Hence, in a syllogism having one premiss negative, of the *major* and *minor* terms, one is affirmed to agree wholly or partially with the middle term, and the other is affirmed to wholly or partially be separated from the middle term, and therefore the major and minor terms must be wholly or partially separate, that is, the conclusion in such a syllogism is negative.

Rule 7 may be deduced from the preceding six, thus :— If the two premisses are particular, they must be II, IO, OI, or OO. The premisses OO are excluded by Rule 5. II would clearly give undistributed middle, for I distributes neither its subject nor its predicate. Now IO or OI will give a negative conclusion, if any at all, by Rule 6. Therefore, the major term must be distributed to avoid *illicit major*; and the middle must be distributed to avoid undistributed middle. Hence, two terms must be distributed in the premisses. But OI or IO distribute only one term, *viz.*, the predicate of O; hence, any conclusion from them as premisses, must be obtained by means of an undistributed middle, or an illicit major. Therefore, two particular premisses give no conclusion.

Rule 8. The only possible pairs of premisses of which one is particular, are:—AI, AO, EI, EO, and of these, EO are excluded by the fifth rule. The premisses AI, distribute only one term between them, *viz.*, the subject of A. This must be the middle term, to avoid undistributed middle; hence, by Rule 4, no term can be distributed in the conclusion which must therefore be *particular*. The pairs of premisses, AO and EI, each distribute two terms. One must be the middle term, and the other the major term, as the conclusion is negative by Rule 6, and, therefore, distributes its predicate. Hence, the minor term cannot be distributed in the premiss, and, therefore, cannot be distributed in the conclusion, which is consequently a particular proposition.

Rule 9. This may be deduced from the first six rules, as follows :—The minor premiss being negative, the major must be affirmative by Rule 5, and it is particular by Rule 9 itself. Therefore, the major premiss can distribute no term,

and the *major* term consequently is undistributed in its premiss. The conclusion, however, being negative by Rule 6, distributes the major term, and we must have the *illicit major*. This is clearly seen in an example—

Some M's are P,
No S's are M,
therefore Some S's are not P,

which clearly is guilty of illicit major.

Résumé of Chapter XV.

I. Definitions.
1. A syllogism is a reasoning consisting of three propositions and containing three, and only three, terms.
2. The *middle* term is the term which does not occur in the conclusion.
3. The *major* term is the predicate of the conclusion.
4. The *minor* term is the subject of the conclusion.
5. The *minor* premiss is the one containing the minor term.
6. The *major* premiss is the one containing the major term.

II. Rules.
1. Six primary rules—
a. Every syllogism has three, and only three, terms.
b. Every syllogism consists of three, and only three, propositions.
c. The middle term must be distributed once at least and must not be ambiguous.

d. No term may be distributed in the conclusion which is not distributed in its premiss.

e. From negative premisses nothing can be inferred.

f. If one premiss be negative, the conclusion must be negative. Conversely, to prove a negative conclusion, one premiss must be negative.

2. Three corollaries from the above.

a. From two particular premisses nothing can be inferred.

b. If one premiss is particular the conclusion is so also.

c. From a particular major and negative minor nothing can be inferred.

Exercises on Chapter XV.

1. Point out the major, minor, and middle terms in the following syllogisms and test their validity with reference to the rules of the syllogism.

a. All vegetables are useful,
All cabbages are vegetables,
therefore, All cabbages are useful.

b. All vegetables are useful,
All cabbages are useful,
therefore, All cabbages are vegetables.

c. The highest good is the end of life,
Death is the end of life,
therefore, Death is the highest good.

d. All animals can move,
Protococcus can move,
therefore, Protococcus is an animal.

e. All metals are elements,
Brass is a metal,
therefore, Brass is an element.

2. Put the following arguments into strict logical form and test their validity.
   a. The atmosphere has weight, for it is a material substance, and all material substances have weight.
   b. All planets move round the sun, therefore the earth moves round the sun, for it is a planet.
   c. David was mad, for he scribbled on the walls, and madmen do so.
3. Express the arguments in Question 2 in symbols.
4. Illustrate the arguments in Question 1 by Euler's circles.
5. Test the following—
   a. All P's are M: All S's are M: therefore All S's are P.
   b. All P's are M: All M's are S: therefore All S's are P.
   c. No P's are M: No M's are S: therefore No S's are P.
   d. No M's are P: All S's are M: therefore No S's are P.
6. If the major term of a syllogism is the predicate of the major premiss, what is known about the minor premiss?
7. Prove that when the minor term is the predicate of the minor premiss the conclusion cannot be A.
8. Prove that two particular premisses give no conclusion.

CHAPTER XVI.

Figure and Mood of the Syllogism.

In the preceding chapter we have discussed the rules by which syllogistic arguments may be tested. In the present chapter we shall determine all the various forms which a valid syllogistic argument may take.

The form of a syllogism, as determined by the quality and quantity of the propositions forming it, is called the *Mood* of the syllogism. Thus, the syllogism—

All M's are P,
All S's are M,
therefore All S's are P

is of the mood AAA, which simply means that all the three propositions constituting it are universal affirmative propositions. Similarly, EAE, AAI, etc., are moods. The student must carefully note that in giving the mood of a syllogism the order of the propositions is the logical order, *viz.*, major premiss, minor premiss, conclusion. Thus, the mood EAE means that the major premiss is E, the minor premiss A, and the conclusion E. By the *figure* of a syllogism is meant the form it takes as depending on the order of the terms in the premisses. We have seen (Chapter XV.) that the order of the terms in the conclusion is invariable, for in every syllogism the predicate of the conclusion is the major term and the subject of the conclusion

the minor term. Hence, the empty symbolic form of the conclusion is S–P. In the premisses, however, the terms may occur in any order. Since each term occurs twice in any syllogism, and the conclusion contains the major and minor terms, it is clear that the terms which must occur in the two premisses of any syllogism are S, P, M, M. The middle term cannot occur twice in one premiss, for if it did the other premiss would be S–P or P–S, and with this the conclusion S–P would be identical or be obtained from it by immediate inference. This limits us to *four* possible arrangements of the terms in the premisses. They are—

1	2	3	4
M–P	P–M	M–P	P–M
S–M	S–M	M–S	M–S

These are known as the *first*, *second*, *third* and *fourth* figures respectively.

We may add the conclusion to each and we then have—

First Figure	Second Figure	Third Figure	Fourth Figure
M–P	P–M	M–P	P–M
S–M	M–S	M–S	M–S
S–P	S–P	S–P	S–P

The student should learn thoroughly the position of the terms in each of the four figures. This is most easily done by learning the position of M in each figure, for when the place of M is known the syllogism may be easily completed.

The possible number of valid moods may be determined by first considering how many different pairs of propositions can possibly stand as premisses and then considering what conclusions are justified by each valid pair of premisses. The major premiss may be A, E, I, O. If the major is A,

the minor may also be A, E, I, or O, without violating Rules 5 and 7, the rules which refer to the premisses. If the major is E, the minor cannot be E or O, by rule 5, and can therefore be only A or I. If the major is I, the minor can be only A, O and I both being excluded by Rule 7 and E by Rule 9. If the major is O, the minor can only be A, as E would be excluded by Rule 5, and I and O by Rule 7. This gives altogether eight valid pairs of premisses.

AA, AE, AI, AO.
EA, EI.
IA.
OA.

The pairs in which each premiss is universal will give a universal conclusion, and, therefore, also, the subaltern to such conclusion.

AI and IA can each only give a particular affirmative as conclusion by Rule 8 ; and AO, EI, OA can each only give a particular negative conclusion by Rules 6 and 8. Hence, altogether, there are 11 possible moods, viz.—

AAA, AAI, AEE, AEO, EAE, EAO,
AII, AOO, EIO, IAI, OAO.

Each of these moods will give four syllogisms, for they may be of any figure. We have to determine, then, how many of these are valid in each of the four figures. This can easily be done by writing them in each figure and testing by rules 3 and 4. Thus, AAA in the four figures is—

1.	2.
All M's are P,	All P's are M,
All S's are M,	All S's are M,
∴ All S's are P.	∴ All S's are P,

3.	4.
All M's are P,	All P's are M,
All M's are S,	All M's are S,
∴ All S's are P.	∴ All S's are P,

Here, 1 is valid ; 2 violates rule 3, giving undistributed middle ; and 3 and 4 both violate rule 4, giving the illicit minor.

If we test in this way, we shall obtain as valid—

In Fig. 1. AAA, AAI, EAE, EAO, AII, EIO,
In Fig. 2. EAE, EAO, AEE, AEO, EIO, AOO,
In Fig. 3. AAI, IAI, AII, EAO, OAO, EIO,
In Fig. 4. AAI, AEE, AEO, EAO, IAI, EIO.

Five of these are rejected as useless. They are—

AAI, EAO, in Fig. 1.
EAO, AEO, in Fig. 2.
and AEO, in Fig. 4.

In each of these, it will be noticed that the conclusion is *particular*, although the universal is justified by the premisses. The conclusion in such syllogism is said to be *weakened*. Thus, in Fig. 1, the premisses EA justify either E or O as conclusion, and we are not likely to be satisfied with O as conclusion, when E is justified by the premisses. Granted the premisses—

No fish have lungs,
All salmon are fish,

the conclusion, *some salmon have not lungs*, is valid, but such conclusion is hardly satisfactory since the premisses justify

No salmon have lungs, as conclusion.

Omitting the five moods with weakened conclusions, we are left with 19 valid and useful moods. There is, in reality, no necessity to retain these 19 moods in memory,

as any syllogism may always be tested by the rules. To enable students easily to remember the moods valid in each figure, the following mnemonic lines were devised more than six centuries ago—

Bārbărā, Cēlārēnt, Dărĭī, Fĕrĭō que prioris;
Cēsărĕ, Cāmēstrēs, Fēstīnŏ, Bărōcŏ, secundae;
Tertia, *Dārāptī, Dĭsămīs, Dātīsĭ, Fĕlāpton,*
Bōcārdō, Fērīsŏn, habet; Quarta insuper addit,
Brāmāntīp, Cămĕnes, Dĭmăris, Fēsāpŏ, Frĕsīson.

These lines contain in italics nineteen words, the vowels of which denote the nineteen valid moods of the syllogism. These words are merely coined for the purpose for which they are here employed, and have no meaning other than the technical meaning here given to them. They are used as the names of the moods they severally stand for. Thus the mood AAA is usually called *barbara*, the mood AOO, *baroco*, and so on.

The words in the mnemonic lines not italicised are real Latin words. They are—

Que, meaning *and*; in Latin placed after the word which it joins to previous words.

Prioris, meaning *of the first* (*figure*).

Secundae, meaning *of the second* (*figure*).

Tertia . . . habet, meaning *the third* (*figure*) *contains.*

Quarta insuper addit, meaning the *fourth* (*figure*) *in addition adds.*

Résumé of Chapter XVI.

FIGURE AND MOOD.

I. Mood.

1. Definition—Mood is the form of the syllogism as determined by the quantity and quality of the propositions of which it consists.
2. In a mood symbol such as AEE, the letters always denote the major premiss, the minor premiss, and the conclusion respectively.
3. There are 11 possible moods.

II. Figure.

1. Definition—the form of the syllogism as determined by the order of the terms in the premisses.
2. There are four possible figures.

a. First figure.	M–P
	S–M
b. Second Figure	P–M
	S–M
c. Third Figure	M–P
	M–S
d. Fourth Figure	P–M
	M–S

III. Combinations of moods and figures.

1. The valid and useful moods of Fig. 1 are—
   Barbara, *Celarent*, *Darii*, and *Ferio*.
2. In Fig. 2 are—
   Cesare, *Camestres*, *Festino* and *Baroco*.
3. In Fig. 3 are—
   Darapti, *Disamis*, *Datisi*, *Felapton*, *Bocardo* and *Ferison*.
4. In Fig. 4 are—
   Bramantip, *Camenes*, *Dimaris*, *Fesapo*, *Fresison*.

Exercises on Chapter XVI.

1. What is mood ?
2. What is figure ?
3. Test EIO in each of the four figures.
4. Test IAI in each of the four figures.
5. Why are there only negative conclusions in Fig. 2 ?
6. Why are there only particular conclusions in Fig. 3 ?
7. Give a concrete example of AEE in each figure. Which are valid ?
8. What rules are broken by *Bramantip* in the first three figures ?

CHAPTER XVII.

Reduction.

The oldest rule for testing the validity of syllogisms is Aristotle's *dictum de omni et nullo* (See Chapter V.). This rule is, however, directly applicable only to syllogisms in the first figure, which Aristotle regarded as the most perfect of the figures. Hence, before the *dictum* could be applied as a test, it was necessary to express in Fig. 1 all syllogisms not already in that figure. This was called the *reduction* of the figure. *Reduction* may be defined as the process of changing a syllogism from any mood and figure in which it may be, into another mood or figure. It is clear, from what has been said of conversion, that an argument stated in one figure may frequently be reduced to another figure, for the conversion of a premiss will often give an equivalent proposition, but such conversion necessarily changes the figure. Thus, take *Festino* of the second figure—

No P's are M,
Some S's are M,
therefore Some S's are not P.

By simple conversion of the major premiss, we have—

No M's are P,
Some S's are M,
therefore Some S's are not P,

and this is *Ferio* of the first figure.

If the student will again look at the mnemonic lines, containing the valid moods in the different figures as given in the last chapter, he will see that the only initials of the names of the different moods are B, C, D and F, and that these all occur in the first line, which gives the moods valid in Fig. 1. The initials of the moods in the other figures are the same as those of the first figure, to which they can be reduced. Thus, *Camestres* of the second figure, and *Camenes* of the fourth figure, on reduction to Fig. 1 become *Celarent.*

Further, the letters s, m and p have meaning. The letter *s*, when following a vowel, denotes that to reduce to Fig. 1, the proposition denoted by the preceding vowel must be *simply converted.* Thus, the *s* in *Festino* means, that to reduce *Festino* to *Ferio*, you simply convert the major premiss denoted by the preceding *e*. The letter *m* is the initial of the Latin *muta* which means *change*, and denotes that the premisses are to be interchanged. Thus, to reduce *Disamis* of Fig. 3, to *Darii* of Fig. 1, we have to simply convert the major premiss as indicated by *s*, to interchange the premisses, as indicated by *m*, and finally to simply convert the conclusion, as indicated by the last letter *s*. If we perform these operations on *Disamis*, that is, on—

Some M's are P,
All M's are S,
therefore Some S's are P,

it becomes—

All M's are S,
Some P's are M,
therefore Some P's are S,

or *Darii* of Fig. 1. In this it must be noticed that P is the minor and S the major term.

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The letter *p* following a vowel indicates that the proposition denoted by that vowel has to be converted *per accidens*. Thus— All M's are P,
All M's are S,
therefore Some S's are P,
or *Darapti* of Fig. 3 becomes, if we convert the minor premiss, *per accidens*, as indicated by the letter *p*—
All M's are P,
Some S's are M,
therefore Some S's are P,
or *Darii* of Fig. 1.

All moods in the second, third, and fourth figures, with the exception of *Baroco* and *Bocardo*, can be reduced to the first figure by conversion and interchange of the premisses. To reduce *Baroco* we must *contraposit* the major and *obvert* the minor premiss.

The *major*, all P's are M, when contraposited, gives —No non-M's are P.

The *minor*, some S's are not M, by obversion, gives —Some S's are non-M.

The conclusion, some S's are not P, remains the same— Some S's are not P.

The resulting syllogism is *Ferio* in Fig. 1, having *non-M* as its middle term.

Bocardo of Figure 3 is—
Some M's are not P,
All M's are S,
therefore Some S's are not P.

By contrapositing the major premiss and interchanging the premisses, we obtain—
All M's are S,
Some non-P's are M,
therefore Some non-P's are S.

This is *Darii* of Fig. 1, the minor term being *non-P*. If we now simply convert the conclusion and then obvert, we have—

Some S's are not P,

which is the original conclusion of *Bocardo*.

No provision is made in the mnemonic lines for the reduction of *Baroco* and *Bocardo* in this way. They were reduced by a special method called *reductio per impossibile*, or *reductio ad absurdum*. The initial *B* indicates that in the cases both of *Baroco* and *Bocardo*, the reduction is to *Barbara*. The premisses of *Baroco* being granted, viz.—

All P's are M,

Some S's are not M,

the conclusion, some S's are not P, either is or is not necessarily true. If the conclusion is false, its contradictory must be true, that is—

All S's are P

is true. This, along with the major premiss of *Baroco*, gives us a new syllogism in *Barbara*, viz.—

All P's are M,

All S's are P,

therefore, All S's are M.

This conclusion contradicts the minor premiss of *Baroco*, which is known to be true. Hence, if we disallow the truth of the conclusion of *Baroco*, and at the same time allow the truth of its premisses, we fall into self-contradiction. The proof of *Bocardo* by this method may be left to the student.

Reductio per impossibile is a round-about method of proof applied to these two cases, because they do not readily admit of reduction to the first figure. It is not usually applied to the other moods, because they can be so readily reduced to Fig. 1, to which Aristotle's *dictum* is directly applicable.

The student will understand now how full of meaning the mnemonic lines are. They have been described as "the magic words which are more full of meaning than any that were ever made."

The student will do well to notice the following peculiarities of the different figures.

Fig. 1. This is the only figure in which A, E, I and O can all be proved. The most important mood is *Barbara*, this being the only mood which is capable of proving A. Further, this is the only figure in which the minor term is the subject of the minor premiss, and the major term the predicate of the major premiss.

Fig. 2. Only a negative conclusion can be established in this figure, for the middle term is the predicate in both premisses, one of which must consequently be negative, to avoid undistributed middle; and one premiss being negative, the conclusion must be negative also by Rule 6.

Fig. 3. In this figure, only *particular* conclusions can be established.

Fig. 4. This figure is somewhat unnatural and is seldom used; it is, in fact, rejected by some logicians.

Lambert, a logician of the eighteenth century, thus described the four figures: "The first figure is suited to the discovery or proof of the properties of a thing; the second to the discovery or proof of the distinction between things; the third to the discovery or proof of instances and exceptions; the fourth to the discovery or exclusion of the different species of a genus."

Résumé of Chapter XVII.

I. *Reduction.*

1. Definitions—
   a. Reduction is the process of changing a syllogism from any mood and figure in which it may be into another mood or figure. Reduction is usually into Fig. 1 from another figure.
   b. *Reductio per impossibile* is a method of proving the conclusion of a syllogism, by showing that a denial of its truth results in a contradiction of one of the premisses.
2. All moods are reducible to Fig. 1 by conversion and transposition, except *Baroco* and *Bocardo*.
3. *Baroco* and *Bocardo* are reducible to Fig. 1 by the help of contraposition and obversion. They may be proved by *reductio per impossibile*.
4. Explanation of *s*, *m*, and *p* in the mnemonic lines.
   a. The letter *s* means *simply convert* the proposition denoted by the preceding vowel.
   b. The letter *m* means *interchange* the premisses.
   c. The letter *p* means *convert per accidens* the proposition denoted by the previous vowel.

II. Characteristics of the figures—

1. Fig. 1 proves A, E, I, and O.
2. Fig. 2 proves only negative conclusions.
3. Fig. 3 proves only particular conclusions.
4. Fig. 4 is unnatural and little used.

Exercises on Chapter XVII.

1. Which figure is of the greatest importance? Why?

2. How is Aristotle's *dictum de omni et nullo* connected with the subject of reduction.

3. What is *Reduction*.

4. Explain all the significant letters in the mnemonic lines.

5. Reduce *Darapti*, *Disamis*, *Datisi*, *Felapton*, and *Ferison*.

6. Reduce *Baroco* and *Bocardo*.

7. Prove *Baroco* and *Bocardo* by *reductio per impossibile*.

8. Why are the premisses of *Fesapo* and *Fresison* not transposed in reduction, like those of the other moods of the fourth figure?

CHAPTER XVIII.

Irregular Syllogisms.

Except in books on Logic one rarely meets with reasoning arranged in strict syllogistic form. This arises from various causes. Sometimes from the desire to be as concise as possible, and sometimes out of compliment to our hearers, we omit one of the premisses, taking it for granted that such premiss is well known to them. Sometimes, too, a premiss is omitted because it is not explicitly present as such to our own minds.

If we say:—*This is valuable, for it is gold*, we are reasoning syllogistically, but the syllogism is not fully expressed. In full our argument would stand—

All gold is valuable,
This is gold,
therefore *This is valuable.*

This is a syllogism of the mood *Barbara* in Fig. 1. The major premiss, *All gold is valuable,* is omitted from the expression of the syllogism in its first form, it being assumed that every one is well aware of the truth of what it asserts.

Such a syllogism is no violation of the rule that every syllogism consists of *three* propositions, for it does in reality consist of three propositions, though only two of these are expressed.

A syllogism in which one proposition is left unexpressed is called an *enthymeme*. An enthymeme is said to be of the *first*, *second*, or *third* order, according as the *major* premiss, the *minor* premiss, or the *conclusion*, respectively, is left unexpressed.

Thus, *he is honest, for he is an Englishman*, is an enthymeme of the *first* order, the unexpressed premiss being the *major*, viz.—

All Englishmen are honest.

An enthymeme of the *second* order is—

He is honest, for all Englishmen are honest,

the minor premiss, *he is an Englishman*, being implied, but left unexpressed.

The conclusion is less frequently omitted, but its omission is of frequent occurrence in witty sayings, the wit often consisting in making the conclusion so evident that it must be drawn by the hearer, and yet leaving it unexpressed.

All Englishmen are honest, and he is an Englishman,

is an enthymeme of the *third* order. The wonderful speech of Mark Antony over Cæsar's body (see *Julius Cæsar*, Act. III, scene 2) contains many enthymemes of the *third* order.

It should be carefully noticed that a fallacy is much more likely to escape detection in an enthymeme than in a fully-expressed syllogism. In testing an enthymeme, of course, the missing premiss must be supplied and the complete syllogism tested.

We not infrequently meet with trains of reasoning in which there is apparently but one conclusion drawn from many premisses. Thus, we may have such a train of reasoning as this—

All A's are B,
All B's are C,
All C's are D,
All D's are E,
therefore All A's are E.

This is in reality a number of connected syllogisms, all of which, except the last, are enthymemes of the third order. Such a series of syllogisms is known as a *sorites*, which means literally, a *heap* of syllogisms.

If we analyse the above we obtain the syllogisms—

1. All A's are B; All B's are C; therefore All A's are C.
2. All A's are C; All C's are D; therefore All A's are D.
3. All A's are D; All D's are E; therefore All A's are E.

The above is an example of the *ordinary* or *Aristotelian sorites*. In forming such a *sorites*, two rules should be observed—

1. *Only one premiss* (*the first*) *can be particular.*
2. *Only one premiss* (*the last*) *can be negative.*

It will form a useful exercise for the student to find out the reason for these rules.

It is possible to form a *sorites* having its premisses in the reverse order of the above, thus—

All D's are E,
All C's are D,
All B's are C,
All A's are B,
therefore All A's are E.

This is called the *Goclenian sorites*, after the name of Goclenius, a German philosopher (A.D. 1547 to 1628), who first enunciated it.

The special rules for the *Goclenian sorites* are—

1. *Only one premiss* (*the first*) *can be negative.*
2. *Only one premiss* (*the last*) *can be particular.*

The student can, by analysing any example of the *Goclenian sorites* into its consistent syllogisms, easily discover the reasons for these rules.

The above example of the ordinary *sorites* consists, as we have seen, of three simple syllogisms, the conclusion of the first being a premiss of the second, and the conclusion of the second a premiss of the third.

A syllogism, the conclusion of which stands as a premiss in another syllogism, is called a *prosyllogism*, and the one in which such conclusion is a premiss is called an *episyllogism*.

Thus the syllogism—

All A's are B,
All B's are C,
therefore All A's are C,

is a prosyllogism to—

All A's are C,
All C's are D,
therefore All A's are D,

which is an episyllogism with reference to the preceding prosyllogism.

Résumé of Chapter XVIII.

I. An *enthymeme* is an incompletely expressed syllogism.

1. An *enthymeme of the first order* is a syllogism having its major premiss unexpressed.
2. An *enthymeme of the second order* is a syllogism with an unexpressed minor premiss.
3. An *enthymeme of the third order* is a syllogism with an unexpressed conclusion.

II. *Sorites* is a number of syllogisms joined in a series.

1. Ordinary or Aristotle's sorites has the premiss which contains the subject of the conclusion stated first.
2. The Goclenian sorites has the premiss which contains the predicate of the conclusion stated first.

III. A *prosyllogism* is a syllogism, the conclusion of which is a premiss to another syllogism, this latter being called an *episyllogism*.

Exercises on Chapter XVIII.

1. Give two concrete examples of each order of enthymeme.
2. Analyse the following ordinary sorites into its constituent syllogisms—

I am a hard-working student,
All hard-working students pass their examinations,
All who pass their examinations gain good appointments,
All who gain good appointments have good incomes,
therefore
I shall have a good income.

3. Write the ordinary sorites in Question 2 in the form of the Goclenian sorites.
4. Why can the ordinary sorites have only one premiss, and that the first, particular?
5. Explain *prosyllogism* and *episyllogism*.
6. Why, in the Goclenian sorites, can there be only one premiss, and that the first, negative?

CHAPTER XIX.

Mixed Syllogism.

In all the syllogisms so far discussed, the premisses have both been *categorical* propositions. Syllogisms are frequently met with, however, in which one premiss is a *hypothetical* proposition, as also are those in which one premiss is a disjunctive proposition. Such syllogisms are generally called mixed syllogisms. A hypothetical proposition consists of two parts, the *antecedent* and the *consequent*. The antecedent is the part which states the condition, and is introduced usually by the word *if*, but not infrequently by other equivalent words or phrases, such as—*provided that*, *whenever*, *given that*, *granted that*, etc.; the consequent is the part of the hypothetical proposition which contains the statement made under the condition given in the antecedent. Thus, *if he studies, he will pass his examination*, is a hypothetical proposition, of which *if he studies* is the antecedent, and *he will pass his examination* is the consequent.

Since the truth of the consequent follows from the truth of the antecedent, it is clear that, in *thought*, the antecedent precedes the consequent; in *expression*, however, the consequent almost as frequently as not precedes the antecedent. There is no difference in meaning between—

If the temperature falls it will freeze,

and, *It will freeze if the temperature falls.*

The order *antecedent—consequent*, is the strictly logical order, and this order should be preserved in dealing with mixed syllogisms containing a hypothetical premiss.

The *mixed hypothetical syllogism* may be defined as a syllogism having for its major premiss a hypothetical proposition and for its minor premiss a categorical proposition: *e.g.*—

If it thundered, it lightened (hypothetical major)
But it did thunder, (categorical minor)
therefore, *It lightened.*

Since the minor premiss may affirm or deny the antecedent or the consequent of the hypothetical major premiss we have four *possible* types of mixed hypothetical syllogisms. The premisses of these may be represented in symbols thus:—

1. If A is B, C is D,
   But A is B.
2. If A is B, C is D,
   But A is not B.
3. If A is B, C is D,
   But C is D.
4. If A is B, C is D,
   But C is not D.

Now the question arises which of these four pairs of premisses will give a valid conclusion? It is easy to see that the first pair of premisses justify the conclusion *C is D*. Consider a concrete example of the same form, *e.g.*—

If this is bread, it is good to eat,
But it is bread,
therefore It is good to eat.

This is clearly true whenever the premisses are true; for if not we should have a conclusion, *it is not good to eat*, which with the minor premiss, *it is bread*, contradicts the

major premiss ; that is, it is possible to allow the truth of the major and minor premiss and deny the truth of the conclusion only by falling into contradiction. Hence, Case 1 gives a valid conclusion.

Take a concrete example of the form of the second pair of premisses, *e.g.*—

If this is bread, it is good to eat ;
But it is not bread.

This, clearly, will not give us the conclusion—

It is not good to eat,

for there are many things good to eat other than bread, and it may be one of these. The conclusion, *it is good to eat*, would be consistent with the premisses, as well as the conclusion, *it is not good to eat.*

Hence no conclusion can be drawn.

Consider the third case, of which this is a concrete example—

If this is bread, it is good to eat ;
But it is good to eat.

If any conclusion follows it must be—

It is bread.

But this does not follow, for it may be something other than bread and still be good to eat, in which case our premisses would be true and the conclusion, *it is bread*, false. The conclusion is, therefore, invalid.

This is a concrete example of the fourth type—

If this is bread, it is good to eat.
But it is not good to eat.

If these premisses give a conclusion it evidently is—

therefore *It is not bread.*

The premisses do justify this conclusion ; for if not, then the premisses can be true and the conclusion false. Assume such a case. Then, the conclusion being false, *it is bread*

must be true. From this and the major premiss, it follows (by Case 1) that *it is good to eat*, and this contradicts the minor. Hence, if the conclusion be not true, we fall into contradiction. Therefore, the conclusion, *it is not bread*, is a valid inference from the premisses.

Case 1, in which the minor premiss affirms the antecedent of the major, and Case 4, in which the minor denies the consequent of the major premiss, give valid conclusions, and they are the only ones which do so. Hence, we may use, as a test of the validity of mixed hypothetical syllogisms, the rule: *In mixed hypothetical syllogisms, either the antecedent must be affirmed, or the consequent denied.*

A syllogism, in which the minor denies the antecedent of the major premiss, contains the *fallacy of denying the antecedent*, as it is called; and a syllogism, the minor premiss of which asserts the truth of the consequent, contains what is called the *fallacy of affirming the consequent.*

Mixed hypothetical syllogisms can always be reduced to the form of a categorical syllogism, and can then be tested by the syllogistic rules. The first case considered above is equivalent to—

All things which are bread are good to eat,
This is bread,
therefore This is good to eat.

This is *Barbara* in Fig. 1.

The second case is equivalent to—

All things which are bread are good to eat,
This is not bread,
therefore This is not good to eat,

a syllogism containing the fallacy of the *illicit process of the major term*, of which the fallacy of *denying the antecedent* is the equivalent.

Case 3 in categorical form—

All things which are bread are good to eat,
This is good to eat,
therefore This is bread.

In this there is the fallacy of the *undistributed middle term*, of which the fallacy of affirming the consequent may be regarded as the equivalent.

In the mixed disjunctive syllogism, the major premiss is a disjunctive proposition (see Chapter VIII.), and the minor premiss a categorical proposition. There are two forms which may be written thus :—

1. A is either B or C,
But A is B,
therefore A is not C.

} This is called the *modus ponendo tollens.*

2. A is either B or C,
But A is not B,
therefore A is C.

} This is called the *modus tollendo ponens.*

The name given to the first, *modus ponendo tollens*, means, literally, the *mood which by affirming denies*, and although awkward, is appropriate enough, since in this, a minor premiss which *affirms* is followed by a conclusion which *denies*. The name given to the second form, *modus tollendo ponens*, means the *mood which by denying affirms*, and was given to this form because in it the minor which *denies* is followed by a conclusion which *affirms*.

The *modus ponendo tollens* is valid only if the disjunctives are mutually exclusive. Thus, *honesty* and *roguery* being mutually exclusive, the disjunctive syllogism—

A. B. is either an honest man or a rogue,
He is an honest man,
therefore He is not a rogue,

which is a case of the *modus ponendo tollens*, is valid. The case is different, however, with the following syllogism, which is of the same form—

He is either knave or fool,
He is a knave,
therefore He is not a fool.

In this, the conclusion is invalid, for he may be both knave and fool, *knavery* and *foolishness* not being mutually exclusive.

The *modus tollendo ponens* is always valid, whether the alternatives are mutually exclusive or not Thus, if we know that—

A. B. is either a soldier or a sailor,

and are further told that—

He is not a soldier,

we know certainly that—

He is a sailor.

Résumé of Chapter XIX.

Mixed Syllogisms.

I. Mixed hypothetical syllogisms are those having a hypothetical major and a categorical minor premiss.

1. Rule.—*Either the antecedent must be affirmed or the consequent denied.*
2. Types—
   a. If A is B, C is D ; but A is B, therefore, C is D. —Valid.

b. If A is B, C is D ; but A is not B, therefore, C is not D. Invalid—commits the *fallacy of denying the antecedent.*

c. If A is B, C is D ; but C is D, therefore, A is B. Invalid—committing the fallacy of *affirming the consequent.*

d. If A is B, C is D ; but C is not D ; therefore, A is not B. Valid.

3. All mixed hypothetical syllogisms are reducible to the categorical form. By this reduction—

a. The fallacy of denying the antecedent becomes the *illicit process of the major term.*

b. The fallacy of affirming the consequent becomes the fallacy of the *undistributed middle term.*

II. Mixed disjunctive syllogisms are those in which the major premiss is a *disjunctive* and the minor a categorical proposition. There are two types—

1. The *modus ponendo tollens*, having an affirmative minor premiss and a negative conclusion. This is valid only when the disjunctives are mutually exclusive.

2. The *modus tollendo ponens*, having a negative minor premiss and an affirmative conclusion. This is always valid.

Exercises on Chapter XIX.

1. Explain *hypothetical proposition, antecedent, consequent.*
2. Test the arguments—
   a. If that plant is the deadly nightshade, it is poisonous.
   It is the deadly nightshade,
   therefore, It is poisonous.
   b. If he is guilty he will be hanged,
   But he is not guilty,
   therefore, He will not be hanged.
   c. If he is guilty he will be hanged,
   He will be hanged,
   therefore, He is guilty.
3. Reduce the syllogisms in Question 2 to the categorical form and test them by the syllogistic rules.
4. Explain carefully why *A is B* is not a valid inference from the premisses—
   If A is B, C is D,
   But C is D.
5. Is the following a valid argument ?—
   If there were no dew the weather will be foul,
   But there was dew,
   therefore, The weather will be fine.
6. What kind of argument is this—
   I cannot dig ; to beg I am ashamed.
7. Test—
   We shall have a tempest, for it is very warm.
8. Put the following argument into the form of a mixed hypothetical syllogism, and test it—
   "Since the laws allow everything that is innocent, and avarice is allowed, it is innocent."—(*London University.*)

CHAPTER XX.

The Dilemma.

There is still one kind of syllogism which we have not yet explained and which deserves explanation, if for no other reason than this, that its name is a word often used and frequently with no very clear idea of its meaning. It is the *dilemma*.

The dilemma is a syllogism in which the *major* premiss is a *compound hypothetical* proposition, and the *minor* premiss a *disjunctive* proposition. In accordance with the definition we shall obtain four types, as is clear from the following examples—

1. If A is B, C is D; and if E is F, C is D
   (compound hypothetical major premiss),
   But either A is B or E is F
   (disjunctive minor premiss),
   therefore C is D.
2. If A is B, C is D; and if A is B, E is F
   (compound hypothetical major),
   But either C is not D or E is not F
   (disjunctive minor),
   therefore A is not B.
3. If A is B, C is D; and if E is F, G is H
   (compound hypothetical major),
   But either A is B or E is F
   (disjunctive minor),
   therefore either C is D or G is H.

4. If A is B, C is D; and if E is F, G is H
(compound hypothetical major),
But either C is not D or G is not H
(disjunctive minor),
therefore either A is not B or E is not F.

In Example 1, it will be seen that the major premiss has two *antecedents*, but only one *consequent*. To obtain a valid conclusion in accordance with the rules for mixed hypothetical syllogisms, the minor must affirm the antecedent or deny the consequent. It cannot deny the consequent, for, if it did, it would be categorical, and the argument would not be a *dilemma*; the disjunctive affirmation of the two antecedents of the major premiss gives the necessary disjunctive minor.

Dilemmas with *affirmative* conclusions are called *constructive*, those with *negative* conclusions *destructive*; those with *categorical* conclusions are said to be *simple*, and those with *disjunctive* conclusions *complex*. Hence the first example is a *simple constructive* dilemma.

In Example 2, there is but one antecedent and two consequents in the major premiss, hence the only possible way to obtain a disjunctive minor premiss is to disjunctively deny the consequent. We thus obtain a categorical conclusion. This is the *simple destructive* dilemma.

In Example 3, the major premiss contains two antecedents and two consequents. Hence we can with this major premiss obtain two disjunctive minor premisses, for we may have as a minor premiss either the disjunctive affirmation of antecedent which gives Example 3, or the disjunctive denial of the consequent, which gives Example 4. Clearly, in both Examples 3 and 4, we must have a disjunctive conclusion.

Example 3 is known as the *complex constructive* dilemma, and Example 4 the *complex destructive* dilemma. The following table shows the principle on which dilemmas are named.

			Dilemma.
Conclusion.	I. Categorical	1. Affirmative	Simple constructive
		2. Negative	Simple destructive
	II. Disjunctive	3. Affirmative	Complex constructive
		4. Negative.	Complex destructive.

The following are concrete examples of the four kinds of dilemmas—

1. *Simple constructive dilemma.*—A cowardly soldier before battle, might argue:—If I run away I shall be killed for deserting the ranks, and if I stay I shall be killed in battle; therefore, in either case, I am sure to be killed.
2. *Simple destructive dilemma.*—If that ship catches the trade winds, it will have a short and prosperous voyage; but its voyage either will not be short or will not be prosperous: therefore, it will not catch the trade winds.
3. *Complex constructive dilemma.* — If a man is rich he is troubled by the care of his riches, and if he is poor he is anxious to obtain wealth; but either he is rich or poor: therefore, he is either troubled or anxious.
4. *Complex destructive dilemma.*—If our education improves, our commerce will increase, and if we have an efficient navy our commerce will be safe; but either our commerce is not increasing, or it is not safe; therefore, either our education is not improving or we have not an efficient navy.

The characteristic feature of the dilemma is that it allows a choice of two alternatives. In practice, the dilemma is

generally so contrived that, of the two alternatives, one must be accepted, although both are so disagreeable that the opponent would willingly reject both if possible. It is this difficulty of making a choice between equally unpleasant alternatives that is called *being on the horns of a dilemma*.

When a dilemmatic argument offers three alternatives, it is called a *Trilemma;* when four a *Tetralemma*, and when more than four a *Polylemma*.

The best way of escaping from "the horns of a dilemma" is to frame another, such that its conclusion contradicts the conclusion of the original dilemma and is equally evident. This is called *rebutting* the dilemma.

A very old example of a dilemma, and the way in which it may be rebutted, is the following:—

An Athenian mother said to her son:—"Do not enter public life, my son, for if you do and act justly men will hate you, and if in public life you act unjustly the gods will hate you!" The son replied "I will enter public life, for if in it I act justly the gods will love me, and if unjustly men will love me."

It will be seen in this case that the mother in the major premiss of her dilemma gives a one-sided view of the truth and that the apparent cogency of the conclusion depends upon a partial suppression of the truth. It is not the whole truth that her son will be hated by the gods if he acts unjustly. To give the whole truth she should have added, *but loved by men*: so his gaining the hate of men is only the partial consequence of his acting justly, for he will by so doing gain the love of the gods. The flaw in a dilemmatic argument should always be looked for in the major premiss.

Résumé of Chapter XX.

I. Definitions—
   1. *Dilemma.*—A syllogism with a compound hypothetical major and a disjunctive minor premiss. The dilemma offers two alternatives.
   2. *Trilemma.*—A dilemmatic argument offering three alternatives.
   3. *Tetralemma.*—A dilemmatic argument offering four alternatives.
   4. *Polylemma.*—A dilemmatic argument offering more than four alternatives.

II. Kinds of dilemmas—
   1. *Simple constructive*, having a *categorical affirmative* conclusion.
   2. *Simple destructive*, having a *categorical negative* conclusion.
   3. *Complex constructive*, having a *disjunctive affirmative* conclusion.
   4. *Complex destructive*, having a *disjunctive negative* conclusion.

III. To *rebut* a dilemma is to frame another dilemma having a contradictory but equally cogent conclusion.

Exercises on Chapter XX.

1. What is a dilemma? Can a dilemma offer more than two alternatives?
2. Give a symbolic and a material example of the *simple constructive dilemma.*

3. When is a dilemma said to be *destructive*? Give an example.

4. What kind of argument is this? Is it valid?

   All existences are either mental or material; nothing is neither mental nor material; therefore nothing is not an existence. (Dr. Ray's *Logic*.)

5. What is meant by *rebutting a dilemma?*

   Rebut:—If virtue were a habit worth acquiring, it must insure either power, or wealth, or honour, or pleasure; but virtue insures none of these; therefore, virtue is not a habit worth acquiring.

6. An old dilemma is the following:—

   Protagoras teaches Euathlus rhetoric for a certain fee, half to be paid at once, and the other half when Euathlus wins his first law case. Euathlus undertaking no case, is sued for the remainder of the fee, and is confronted by Protagoras with this dilemma. "You must pay this fee, for if you lose this case you will have to pay me by order of the court, and if you gain it you must pay me in accordance with our agreement, for then you will have won your first case."

   Can this be rebutted?

CHAPTER XXI.

Fallacies.

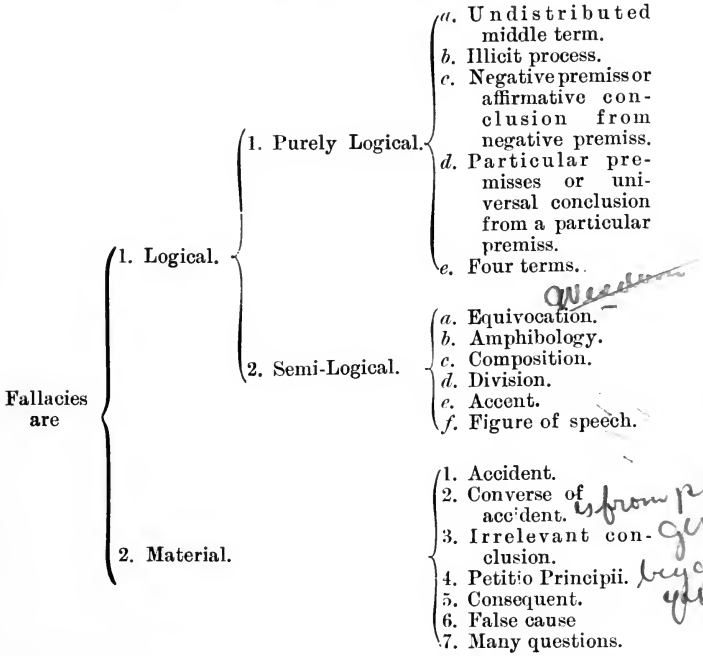
We have already had many cases of conclusions which were not justified by the premisses from which such conclusions were drawn. In all such cases a *fallacy* is said to be committed.

A *fallacy* may be defined as "any unsound mode of arguing, which appears to demand our conviction, and to be decisive of the question in hand, when in fairness it is not."

Since Logic treats of the principles of *valid* reasoning, it may at first appear strange to the student that text books of Logic always include a section on invalid forms of reasoning. It is, however, clear, that a knowledge of the commonest forms of invalid reasoning must be of great service in the effort to avoid invalid reasoning. It is an old and true saying that "the knowledge of contraries is the same." *Valid* and *invalid* reasoning may be regarded as relative terms, a knowledge of either involving a knowledge of the other. The rules of the syllogism are as much rules for avoiding invalid reasoning as they are for reasoning validly. Hence, in treating of *valid* reasoning, we necessarily at the same time, more or less, fully treat of *invalid* reasoning, and the fallacy committed in violating any rule of Logic is, perhaps, best discussed when such rule

is under consideration. It is, however, convenient to bring the various fallacies together into one section and treat of them together. Various attempts have been made to classify fallacies, none of which are entirely satisfactory. The simplest classification is Whately's, and his is a mere modification of Aristotle's. He first divided fallacies into those in the form of expression *(fallacies in dictione)*, and those in the *matter (fallacies extra dictionem)*. The fallacies in the form of expression he called *logical fallacies*. In the case of a logical fallacy the conclusion does not follow validly from the premisses : such fallacy can be detected by the mere logician without any knowledge of the subject matter of the argument. The fallacies in the matter or *material* fallacies are those arguments in which the conclusion does follow from the premisses, but yet is fallacious owing to some fault in the premisses. Such fallacies cannot be detected by the mere logician ; for their detection a knowledge of the subject matter of the argument is needed. Material fallacy is in Whately's classification a *species infima*. He enumerates seven individual fallacies of this class. *Logical fallacy* is further divided into the two species—*purely logical fallacy* and *semi-logical fallacy*. A purely logical fallacy is a violation of any of the rules of the syllogism except the second part of Rule 3 ; a semi-logical fallacy is a violation of the second part of the third rule, or less frequently an ambiguous use of the major or minor term.

The following table shows these classes and the individuals constituting the *species infima*—



The purely logical fallacies have been already discussed, in connection with the rules of the syllogism.

The semi-logical fallacies are nearly all cases of the ambiguous middle term. The rules of the syllogism enable us to tell that there is a fallacy as soon as we know the middle term is ambiguous; but to detect what the ambiguity is is impossible without a knowledge of the subject matter of the argument, hence the name *semi-logical* applied to these fallacies. We proceed to explain each of the semi-logical fallacies. The student should carefully

notice that the names given to the various fallacies are technical terms, and as such have a definite connotation which may differ from the meaning ordinarily attributed to them when used in common parlance.

By *equivocation* is meant the fallacy arising from the use of a term in two different senses in the same argument. This is, perhaps, the commonest of all fallacies, and is frequently very difficult to detect. The examples of ambiguous middle already discussed are cases of *equivocation*. Here is another example—

The end of life is the highest good,
Death is the end of life,
therefore Death is the highest good.

In this argument the middle term, *the end of life*, is used in different senses in the two premisses; in the major premiss it means the *object to be aimed at in life*, but in the minor premiss it means the *cessation of vital action*.

Another example is—

To call you an animal is to speak the truth,
To call you an ass is to call you an animal,
therefore To call you an ass is to speak the truth.

That there is a fallacy in this is evident, but what that fallacy is is not so apparent. The student may exercise himself in explaining it.

Amphibology is a fallacy arising from a loose grammatical structure. Many examples of this fallacy may be culled from newspaper advertisement columns. Here are two examples:—"A piano for sale by a lady about to cross the channel in oak case with carved legs."—"For sale—a large retriever; will eat anything, very fond of children."

Fallacies such as these may raise a laugh, but can scarcely mislead anyone. This is not, however, always the

case with fallacies of *amphibology*. It is impossible to tell from the words alone whether *twice two and three* are *seven* or *ten*.

Occasionally it is difficult or impossible to distinguish the subject from the predicate in a proposition. The Latin language is peculiarly liable to this ambiguity, and it is therefore, a language specially suited for giving oracular answers to replies about the future, answers which are sure to be right, however the event may turn out. If translated into English the ambiguity often disappears. A well-known example is—

Aio te Romanos vincere posse,

that is, in English—

I say that you the Romans can conquer.

Two good examples of (intentional) amphibology occur in Shakespeare. One of these occurs in *Henry VI.*, where it is said—

"The Duke yet lives that Henry shall depose,"

and the other in *Richard II.*, where York says—

"He loves you on my life and holds you dear,
As Harry, Duke of Hereford, were he here."

Let the student try to grammatically parse the words in these two cases and he will at once detect the ambiguity.

The fallacy of *composition* is that particular case of ambiguity of a term in which in one case of its occurrence the term is used in a *distributive* sense, and in the other in a *collective* sense. Thus, if we argue—

All the angles of a triangle are less than two right angles,
A, B, C, are all the angles of a triangle,
therefore
A, B, C, are less than two right angles,
we commit the fallacy of composition.

Other examples are—

A cannot lift this box, B cannot lift it,
therefore A and B cannot lift it.

I can afford to buy all I want, for I can afford to buy A, I can afford to buy B, I can afford to buy C, and A, B, C are all I want.

The fallacy of *division* is the converse of the fallacy of composition. It arises from first using a term in a *collective* sense and assuming that what is true of it in that sense, is also true of it when used in a distributive sense, *e.g.*—

A can sing a duet,
B can sing a duet,
for A and B can sing a duet.

All the angles of a triangle are equal to two right angles,
A is one of the angles of a triangle,
therefore A is equal to two right angles.

The fallacy of *accent* arises whenever greater importance is attributed to any word than is warranted by the context or was intended by the writer or speaker. In the First Book of Kings (Chapter XIII., v. 27), occur the words:—"And he spake to his sons, saying, 'Saddle me the ass.' And they saddled *him*". If in reading this passage the word "him" be strongly accented, as the fact of its being italicised might suggest it should be, we fall into the fallacy of accent, for we suggest a meaning to the word evidently different from that intended to be expressed by it. The translators of our Authorised Version of the Bible had words printed in italics to denote that words so printed had no corresponding words in the original Hebrew text; hence, in the Bible, italics do not denote special accent, but rather an absence of any accent at all.

It is an example of this fallacy: "when the country parson reads out, 'Thou shalt not bear false witness *against* thy neighbour' with a strong emphasis on the word 'against', his ignorant audience leap to the conclusion that it is not amiss to tell lies provided they be in favour of one's neighbour".*

Almost any sentence can be made to convey as many meanings as it contains words by emphasising each word in turn. Fallacies may, and often do, arise from taking for granted that words derived from the same root have corresponding meanings. Thus, it might be thought that he who tells a *lie* is a *liar*. This is not, however, necessarily so, for the word *liar* implies the *habit* of lying. Similarly, it is possible to *thieve*, without being a *thief*, to *drink* without being a *drunkard*, to follow a *craft* without being *crafty*, and so on. Fallacies arising from this cause are known as *fallacies of figure of speech*, or *fallacies of paronymous terms*.

A good example is—

Projectors are unfit to be trusted,
This man has formed a project,
therefore, This man is unfit to be trusted.

Mrs. Malaprop falls into this fallacy when she says she would have her daughter *artful*. Another example may be quoted from Shakespeare's *Richard II.*

Bolingbroke. Go, some of you convey him to the tower.
King Richard. O, good, convey? Conveyors are you all,
That rise thus nimbly by a true king's fall.

The word "conveyor" in Elizabethan English meant a *thief*.

* St. George Stock's *Logic*.

Résumé of Chapter XXI.

I. Fallacy. Any unsound mode of arguing which appears to demand our conviction and to be decisive of the question in hand when in fairness it is not.

II. Fallacies are—

I. Logical. Subdivided into

a. Purely Logical.
1. Undistributed middle.
2. Illicit process.
3. Negative premisses or affirmative conclusion where one premiss is negative.
4. Particular premisses or universal conclusion with one premiss particular.
5. Four terms.

b. Semi-Logical.
1. Equivocation.
2. Amphibology.
3. Composition.
4. Division.
5. Accent.
6. Figure of speech.

2. Material Fallacies (*See Résumé of Chapter XXII.*)

III. Definitions—

1. *Equivocation* is the use of one term in two senses in the same argument.
2. *Amphibology*, an ambiguity due to a faulty grammatical structure.
3. *Composition*, fallacy arising from a confusion of the *collective* and *distributive* use of a term.
4. *Division*, the converse of composition—a fallacy arising from a confusion of the *distributive* and *collective* use of a term.

5. *Accent*, a fallacy which consists in attributing to a word greater importance than it is intended to have.
6. *Figure of speech*, or the *fallacy of paronymous terms*, the fallacy which arises from assuming that words from the same root have corresponding meanings.

Exercises on Chapter XXI.

1. Give an example of the fallacy of *equivocation*.
2. Explain and illustrate the fallacy of *composition*.
3. Explain the distinction between fallacies *in dictione* and fallacies *extra dictionem*.
4. What fallacies (if any) are committed in the following arguments ?
   a. Water is blue, this is a glass of water, therefore it is blue.
   b. To be acquainted with the guilty is a presumption of guilt. This man is acquainted with the guilty ; therefore we may presume that he is guilty.
   c. Five is one number. Three and two are five ; therefore three and two are one number.
   d. All the metals conduct heat and electricity, for iron, lead, and copper do so, and they are all metals.
   e. If there is a demand for education, compulsion is unnecessary.
   f. A man will become strong by drinking brandy, for brandy is a strong drink.

g. When Crœsus has the Halys crossed,
A mighty army will be lost.

h. Justice is the profit of others, therefore it is unprofitable to the just man to be just.

i. "Is a stone a body"? "Yes". "Well, is not an animal a body"? "Yes". "And are you an animal"? "It seems so". "Then you are a stone, being an animal".

CHAPTER XXII.

Material Fallacies.

The fallacies *extra dictionem*, or material fallacies, are, as we have seen—

1. The fallacy of accident.
2. The converse fallacy of accident.
3. The fallacy of the irrelevant conclusion.
4. The fallacy of the *petitio principii*.
5. The fallacy of the consequent, more frequently called *non sequitur*.
6. The fallacy of the false cause.
7. The fallacy of many questions.

These we proceed to explain.

The fallacy of accident is committed whenever we argue that a statement which is true as a general rule is true also in a particular case in which the rule, owing to special circumstances or *accidental* conditions, does not hold. A very old example is—

What we buy in the market we eat;
We buy raw meat in the market;
therefore We eat raw meat.

In this the major premiss gives the general rule, which is true in regard to the *substance*, but the minor premiss introduces a case having the *accidental* condition of *rawness* added; and this condition makes the general rule inapplicable.

Again if we argue—

Gooseberries are eatable,
This is a gooseberry,
therefore This is eatable,

our reasoning is fallacious, unless we take care that the middle term *gooseberry* is used exactly in the same sense. If the particular gooseberry referred to in the minor premiss is *unripe*, this accidental circumstance, not being contemplated by the general rule, renders such rule inapplicable to this case.

If, however, under the same circumstances, we argue—

This is not eatable, and it is a gooseberry,
therefore, Gooseberries are not eatable,

we commit the *converse fallacy of accidents*, for we are arguing to a general rule from a particular case, which owing to the accidental circumstance of its not being ripe is not a typical example.

Another example of the converse fallacy of accident, is—
He who hurts another deserves punishment,
The teacher who punishes a refractory pupil hurts another, therefore, Such teacher should be punished.

In this, *he who hurts another* evidently means he who does so with *malicious intent*; hence, the major premiss makes the general statement *conditionally*, while the minor premiss uses the word *hurts* unconditionally.

This fallacy is often called *fallacia a dicto secundum quid ad dictum simpliciter* (the fallacy of making an unconditional assertion on the ground of an assertion made conditionally). This name should be remembered, although it is such a clumsy one, for it is the name of a very common fallacy.

Sometimes the fallacy of *accident* is called *fallacia a dicto simpliciter ad dictum secundum quid.* (Fallacy of arguing from an unconditional premiss to a conditional conclusion).

It is not always clear whether a fallacy is better explained as a case of the fallacy of accident or of its converse. Thus the fallacy in—

He who hurts another deserves punishment,
The teacher who punishes a refractory pupil hurts another,
therefore, Such teacher deserves punishment,

is explained as a case of the converse fallacy of accident. But if we choose to regard the word *hurts* in the major premiss as being used *unconditionally*, and in the minor premiss *conditionally* (the condition, *for the pupil's good*, being implied), we must regard it as an example of the fallacy of accident.

The fallacy of the *irrelevant conclusion* is often called the *ignoratio elenchi* (ignorance of the refutation). This consists in proving, instead of the proposition whose proof is required, another which is substituted for it. The argument in itself may be valid enough, but the conclusion is not to the point. There are teachers who argue that kindergarten methods are useless, for when children leave the kindergarten they are not so well advanced in reading, writing and arithmetic as they used to be before the introduction of kindergarten methods. But this is beside the point, for what has to be proved in order to establish the uselessness of kindergarten methods, is, that children, after going through the full kindergarten course, are no better trained than they were under the old system.

The street orator commits this fallacy when he dilates upon the great wealth of certain of the nobility, and then proceeds to take for granted that he has proved that such wealth should be distributed among his hearers. What is known as the *argumentum ad hominem* is a particular case of this fallacy. It consists in arguing upon any matter in

such a way that the conclusion reached is based on the character of those connected with it rather than on the merits or demerits of the case itself. If a man is known to be a thief, and is accused of a particular case of theft, it is a difficult matter to base our judgment as to whether he is guilty or not on the facts of the case, and not in any way allow ourselves to be influenced by our knowledge of such a man's character. In olden times, in trial by *Compurgation*,* this logical fallacy had a legal recognition. The only conclusion, however, logically valid, is one drawn *ad rem*, that is, one based on the facts of the case. Such a conclusion is the only one now recognised in English Law, according to which, at present, no evidence of previous crime is allowed until after the jury have given their verdict.

The *argumentum ad hominem* is not infrequently made use of in our Law Courts, where the counsel for the prosecution frequently tries to prejudice the jury against the prisoner by setting forth the heinousness of the crime of which he is accused, or by dilating upon the worthlessness of the prisoner's character.

The *argumentum ad populum* (argument with reference to a people) is of a similar nature, and consists in an appeal to the prejudices or passions of a people in order to warp their judgment.

The *petitio principii* consists in using the conclusion or its equivalent as a premiss from which such conclusion is drawn. It is often called *begging the proof*, and this aptly describes it. The fallacy is common, although it is difficult to give good *short* examples of it. This fallacy and the *ignoratio elenchi* are specially liable to occur in long

* See any History of England.

argumentative speeches, and being enveloped in a multitude of words are by no means always easy of detection. The teacher of mathematics knows how easy it is for students to beg the proof in working exercises in geometry. The fallacy may be illustrated symbolically thus—

The syllogism M is P,
S is M,
therefore S is P,

is valid if we grant the truth of the premisses; but if we proceed to establish the truth of the minor premiss thus—

P is M,
S is P,
therefore S is M,

we evidently assume the truth of "S is P" which is exactly what has to be proved. Whately gives a good instance of this fallacy. He says, "Some mechanicians attempt to prove (what they ought to have laid down as a probable but doubtful hypothesis) that every particle of matter gravitates equally. 'Why'? 'Because those bodies which contain more particles ever gravitate more strongly, *i.e.*, are heavier'. 'But' (it may be urged) 'those which are heaviest are not always the most bulky'. 'No, but still they contain more particles, though more closely condensed'. 'How do you know that'? 'Because they are heavier'. 'How does that prove it'? 'Because all particles of matter gravitating equally, that mass which is specifically the heavier must needs have the more of them in the same space'."

In falling into the fallacy of the *petitio principii*, we are said to be *arguing in a circle*. This should be compared with the *circle in defining*. (See Chapter XIII.)

The fallacy of the *consequent*, or *non sequitur* (it does not follow), as it is often called, consists in drawing a conclusion which has very little or no connection at all with the premisses. Thus, it is evidently a *non sequitur* to conclude that London is a beautiful city, because it is a great city, and all great cities contain great wealth. De Morgan gives as an example of this fallacy—

Episcopacy is of Scripture origin,
The Church of England is the only episcopal church in England,
ergo The church established is the church that should be supported.

The fallacy of the *false cause* is sometimes known as *non causa pro causa* (what is not the cause for the cause). A good example of this fallacy was supplied by Whitefield when he gave as the reason of his being overtaken by a hailstorm the fact that he had not preached at the last town. When one event precedes another we are very likely to take for granted that it is the cause of the phenomenon it precedes. That such a method of argument is wrong is clear, since by it we should have to conclude that night is the cause of day as it always precedes day. This fallacy is denoted by the phrase *post hoc ergo propter hoc* (after this, therefore on account of this). Sometimes what is merely a sign of a phenomenon is regarded as the cause of it, as if it were to be supposed a falling barometer is a *cause* of rain. Not infrequently the effect is regarded as the cause, as when it is thought that much money in a country is the cause of a country's wealth, when it is, in fact, the effect of such wealth.

The fallacy of *many questions* consists in asking, as one question, two requiring different answers, so that the

disputant, if he is allowed to give only categorical replies, commits himself whatever answer he gives. When the counsel for the prosecution says to the prisoner, "How long is it since you ceased to be a forger"? there is involved a fallacy of *many questions*. The question quietly takes for granted that the prisoner was a forger at one time.

A celebrated example of this fallacy is the question put by Charles II. to the then newly-established Royal Society. "Why," he asked, "when a live fish is put into a vessel of water, do the vessel, the water and the fish not weigh more than the basin and water before fish is put in, when if the fish be dead this is not the case"? The learned members of the Society are said to have discussed the question, and formed several hypotheses by way of explanation of such a curious fact. After a considerable time it was suggested by one member that they should try if such were really the case, and after much opposition the experiment was tried, and it was found out that the weight was the same whether the fish was living or dead.

Résumé of Chapter XXII.

Material Fallacies.

1. The *fallacy of accident* or *fallacia a dicto simpliciter ad dictum secundum quid*, is the application of a general rule to a particular case which, owing to special circumstances, does not conform to the rule.

2. The *converse fallacy of accident*, or *fallacia a dicto secundum quid ad dictum simpliciter*, is the proceeding to a general from a particular case, which, owing to special circumstances, is not a typical case.
3. The *irrelevant conclusion*, or *ignoratio elenchi*, is the proof of a truth other than the one required, and the further assumption that what was required has been done. The *argumentum ad hominem* is a frequent form of this fallacy.
4. The *petitio principii*, or *begging the question*, is the taking for granted in the course of the argument the very proposition whose truth is being established.
5. The *fallacy of the consequent*, or *non sequitur*, is the fallacy of drawing a conclusion from premisses with which it has little or no connection.
6. The *fallacy of false cause*, or *non causa pro causa*, is the regarding as cause what is not the cause.
7. The *fallacy of many questions* is the fallacy of asking two questions in one and expecting one categorical answer.

Exercises on Chapter XXII.

1. Give three examples of the fallacy of *accident*.
2. Explain what is meant by a *non sequitur*.
3. Explain the *argumentum ad hominem*.
4. Give an example of the fallacy *a dicto secundum quid ad dictum simpliciter*.

5. What fallacies are committed in the following arguments?

a. A designing man is to be suspected,
This man gains his living by designing,
therefore, He is to be suspected.

b. The verdict of the jury is seldom wrong,
A is a member of the jury,
therefore, His verdict is seldom wrong.

c. The wind blew a gale yesterday because the barometer was very low.

d. When will you become careful?

e. "Shall thine anger burn like fire for ever?"

f. Opium produces sleep because it possesses a soporific quality.

g. A certain Member of Parliament refused to vote for a bill because it was introduced by one who was a bad man.

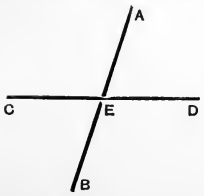
6. Examine the following:—

a. One number must win the prize,
My ticket is one number, and it will therefore win the prize.

b. All that glitters is not gold,
Tinsel glitters,
therefore, Tinsel is not gold. (Whately).

c. Nothing is heavier than platinum,
Feathers are heavier than nothing: therefore,
Feathers are heavier than platinum. (Whately).

Point out the *petitio* in the following:—



Given A B a straight line, and C E, D E two straight lines meeting A B in E, it is required to prove C E D a straight line.

By Euc. I. 15, angle C E B = angle A E D, and angle B E D = angle A E C.

Therefore angle C E B + angle B E D = angle A E D + angle A E C.

But all these angles are together equal to four right angles by Euc. I. 15 cor.

Therefore angles C E B, B E D are together equal to two right angles, and therefore by Euc. I. 14, C E D is a straight line.

CHAPTER XXIII.

Induction.

In this and the following chapters a few of the more important points, with regard to inductive reasoning, will be considered.

We have already seen (Chapter II.) that in an inductive argument the conclusion is more general than the premisses, that is, that the conclusion contains more knowledge than is contained in the premisses; but the premisses contain knowledge known before the inductive inference. Hence, in an inductive argument, we proceed from what is known to what is unknown. Induction has indeed been defined as *an inference from the known to the unknown.* Thus, when Shakespeare says "Murder will out" he is expressing an inductive inference. It had probably come within his experience many times, that murder had been discovered; this experience, together with what he had heard of the experiences of others, formed the premisses on which the general statement was based as an inductive inference.

This conclusion is clearly a much wider truth than all the premisses together, for it contains every case that has occurred since then, as well as every case that may occur in the future.

It is a curious fact that Aristotle, the great Greek philosopher, left Deductive Logic much as we have it now,

but left Inductive Logic in a very undeveloped state. Induction, as a science, was greatly advanced by Lord Bacon, but had to wait till the present century for anything like complete treatment. It first received full treatment at the hands of John Stuart Mill in his "System of Logic," which was published in A.D. 1843.

In an inductive argument there is always an extension of knowledge. How can we make sure that this extended knowledge is reliable ? That is the question that Inductive Logic endeavours to answer. It formulates methods to be followed and rules to be observed in the pursuit of knowledge by induction if we wish our conclusions to be real knowledge. As Deductive Logic treats of the rules which must be observed in drawing valid conclusions syllogistically, so Inductive Logic discusses the rules to be observed in drawing inductive inferences.

The necessity for such rules may be more clearly understood by considering two or three cases of invalid inductive inferences. Previous to the discovery of Australia one might have argued, as no doubt many people did, that *all* swans were white, because every swan hitherto seen by Europeans was white. Such conclusion was proved to be an invalid one by the finding of *black* swans in Australia. Again we might argue—

Italy is a peninsula pointing to the south,
Malaya is a peninsula pointing to the south,
South America is a peninsula pointing to the south,
And so on of many others,

therefore—

All peninsulas point to the south.

Such conclusion is, however, invalidated by such peninsulas as Jutland and Yucatan, which point to the north.

Induction, as exemplified in these two instances, in which the conclusion is based on a greater or less number of individual cases taken at random, is known as *inductio per enumerationem simplicem* (induction by means of a simple enumeration of instances).

This is what Aristotle understood by induction. It was ridiculed by Bacon as being a childish thing and giving utterly untrustworthy conclusions. Here is an instance of *inductio per enumerationem simplicem* as carried out by a child of six years of age: he came to the conclusion that no brightly-coloured flowers are scented, because he had noticed of tulips, snapdragons, pansies, and of several other brightly-coloured flowers that they have no scent. The invalidity of this conclusion is evident.

Bacon saw that a small number of well-selected instances were of far greater weight as evidence of the truth of the general statement than an almost infinite number of haphazard instances.

Does *inductio per enumerationem simplicem* ever give reliable conclusions? There are certain cases in which it gives knowledge as certain as human knowledge can be. In the first place, it gives such knowledge wherever the premisses embrace the uncontradicted experience of the human race. How do we know that an object if unsupported falls to the earth? or that man is mortal? By induction, moreover, an induction *per enumerationem simplicem.*

But the facts of experience on which the conclusion in each of these cases is based, are facts supplied by the uncontradicted experience of the whole human race. Very seldom, however, does it happen that we can make use of premisses so numerous as in these cases.

There is another case in which induction gives sure conclusions and which is intimately connected with induction in its origin. The word *induction* means etymologically a *bringing in—a bringing in* of what? The particular facts contained in the general assertion. For example, A and B are engaged in an argument in which A says "All planets go round the sun". B, however, will not accept this statement. What can A do? He straightway makes use of *induction* to prove his general assertion, by bringing in the particular facts contained in the general statement and trying to get B to allow them one by one.

A. Well, Mercury is a planet and goes round the sun. You allow that?

B. Yes.

A. Venus is also a planet and goes round the sun. Do you allow that?

B. Yes.

A. The earth is a planet and goes round the sun?

B. Yes.

How far must A proceed in his bringing in of the particular cases, before he can be considered to have proved his original assertion? If the conclusion be reached, after bringing in only a part of the cases contemplated in the general assertion, we have an induction *per enumerationem simplicem*, and therefore B will be justified in rejecting the conclusion as invalid.

But if A proceeds to bring in every case of a planet, and B allows, in each case, that it goes round the sun, B is then bound to allow the truth of the assertion "All planets go round the sun", for this is nothing but a short way of expressing all the truths which he has individually accepted. A is said to have completed, or *perfected*, his induction, and

the process is what is known as *perfect induction*. The name must not be understood as meaning that this is a better method of induction than ordinary induction. It merely means that the induction has been *completed*, which is the meaning of the Latin word *perfecta*.

If we take as our definition of induction that it is *inference from the known to the unknown*, it is clear that *perfect induction* is not induction at all. Thus, if I argue—

January has not 32 days,
February has not 32 days,
March has not 32 days,
April has not 32 days,
May has not 32 days,
June has not 32 days,
July has not 32 days,
August has not 32 days,
September has not 32 days,
October has not 32 days,
November has not 32 days,
December has not 32 days,
therefore No month in the year has 32 days,

the conclusion is exactly co-extensive with the premisses, and there is, therefore, no proceeding from *the known to the unknown*. Hence, there is no real induction (according to our definition) in the process. Of course, the term induction may be so defined as to make *perfect induction* one of its constituent species.

Résumé of Chapter XXIII.

I. *Induction* is inference from the known to the unknown.

II. *Inductio per enumerationem simplicem.*

1. Definition.—That form of induction in which the premisses are taken at random without any consideration of their relative value.
2. Reliability.—Reliable only when the premisses are co-extensive with the experience of the human race.

III. *Perfect Induction.*

1. Definition.—The summation of a number of premisses into the form of a general assertion.
2. It contains no inference, and is, therefore, not induction at all.
3. The conclusion is as sure as the premisses.

Exercises on Chapter XXIII.

1. Give three examples of induction.
2. Explain *inductio per enumerationem simplicem.*
3. Explain and give an example of *perfect induction.*
4. Why is *perfect induction* not induction at all.
5. What was the first use of induction ?
6. Why was *induction* developed later than *deduction* ?

CHAPTER XXIV.

Cause, Law of Nature, Explanation.

Much has been written as to the exact meaning of the word *cause*, and much that has been written belongs to the subject of metaphysics rather than the domain of Logic. It is one of the most frequently used of technical terms in science, and is generally used with a definite, clearly intelligible meaning. An example will make its meaning clear.

A storm rages at sea, and during the storm a vessel sinks. In such a case, we say the storm is the *cause* of the vessel sinking, and that the sinking of the vessel is an *effect* of the storm.

According to such use, the *cause* is evidently a phenomenon which precedes the effect, and in the absence of which the effect would not have happened. It should, however, be noticed that usually many causes concur in producing the effect. Thus, a person may die from a complication of ailments, any one of which may be spoken of as the *cause* of his death. Indeed, it seldom or never happens that a phenomenon is the effect of only one cause. In fact, philosophically speaking, all the antecedent conditions of which a phenomenon is the outcome are its cause. Amongst all the antecedent circumstances, however, one is singled out as the *cause*, the one so chosen

generally being the new circumstance immediately antecedent to the effect, or a circumstance to which the result specially directs our attention. Thus, if a man falls into a river and is drowned, there are many circumstances which, in combination, produce the effect, *e.g.*, the circumstances causing his fall (his going out in a boat, possibly) his inability to swim, the fact that his nature is such that he cannot exist under water, the depth of the water, etc. But we probably choose the new circumstance of his going out in a boat, or his inability to swim, a circumstance to which his death calls special attention, and look upon it as the *cause* of his death.

Cause may be defined, then, as "that new circumstance or those new circumstances which precede the given effect, and without which such effect would not occur".

"Anything in the absence of which a phenomenon would not have come to pass as it did come to pass is a cause in the ordinary sense."* Given an effect to discover its cause or causes is the main problem of induction.

"Happy is he who has been able to discover the causes of things,"† wrote the Roman poet Virgil nearly two thousand years ago, and his words express a psychological truth, for now, as in his time, one of the keenest of intellectual pleasures is the discovery of the causes of given effects. In seeking for causes, it is always taken for granted—

1. That every event has a cause.
2. That the same cause always produces the same effect.

The former of these two assumptions is what is known as the *Law of Causation*. It would clearly be fatal to investigation did we not think ourselves justified in assuming that

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* Minto's *Logic*.

† Virgil's *Georgics*, II., 490.

the phenomenon in course of investigation has a cause, and therefore admits of explanation. It is really the assumption that no phenomenon is absolutely isolated from all other phenomena. Our knowledge of any phenomenon is in truth a knowledge of the relations between it and other phenomena. The second of the above two assumptions is what is known as the *Law of the Uniformity of Nature.* Any given natural cause produces the same effect to-day that it did a thousand years ago or that it will do a thousand years hence. It is only on this assumption and conditioned by it that science can foretell events. Thus, the astronomer foretells the exact time at which an eclipse of the moon or of the sun will occur, but he can do this only on the assumption that the course of nature will remain uniform. Should such uniformity cease the expected eclipse may not occur.

On what grounds do we rely for our belief in such uniformity of nature? It is a truth established by *inductio per enumerationem simplicem*, which in this case gives knowledge as certain as any knowledge possible to man, for it is the foundation of all knowledge. The simple enumeration is, however, an enumeration of facts in accordance with the unvarying experience of the whole human race.

The student is now in a position to understand clearly the meaning of the term *law* as used in science. A *law* of nature is a uniformity of nature. To say that it is a *law of nature* that all material things gravitate is merely saying that all material things always do gravitate, the law being merely the assertion of the general truth. The student should carefully distinguish this meaning of the term *law* from that intended when we talk of the *laws* of a

country. In this latter case it means a *command*. A *law of science* is expressed in the *indicative mood*, *a law of a country* in the *imperative mood*. Fallacies frequently arise from a confusion of these two senses of the term *law*. The primary meaning of the term *law* is a command ; and as the laws of the land produce in certain respects a *uniformity* of action on the part of the citizens, any uniformity came to be looked upon as the result of some *law*, and finally the statement of the uniformity came to be regarded as the *law* itself.

Science is mainly concerned in the discovery of the *causes* of phenomena. When the *cause* of any phenomenon is known, the particular uniformity of nature to which it belongs is also known. Thus, if I hear a loud noise and learn that it is caused by the firing of a gun, I am satisfied with what I learn only if I know that it uniformly happens, or is a law, that the firing of a gun always produces a loud noise. When we state the uniformity to which a phenomenon belongs, or, which is the same thing, the law under which it comes, we are said to *explain* it. Thus, why does a stone fall to the earth? Because all things when unsupported do so. This answer is an explanation of the phenomenon of the fall of any particular stone. The explanation consists in the assertion that the fall of the stone is not an isolated phenomenon, but is one of a class, or merely an instance of a uniformity. Of course, we may further want an explanation of this explanation and proceed to ask—Why do all things when unsupported fall to the earth? The answer to this is the statement of a wider uniformity. Because every material thing in nature tends to fall towards everything else. We may again ask for an explanation of this and receive the answer—because every particle of matter in the universe attracts every other particle.

Each of these difficulties is in turn explained by assigning it to a wider law or uniformity of nature till we reach the widest known, beyond which we cannot go. Newton's great law is the widest uniformity yet discovered, and it seems almost as if it is never to be explained as forming merely a part of a still wider law; at least at present no answer can be given to the question — Why does every particle of matter attract every other particle? Or if an answer is given it can only be—Because the Creator has made it so, and this is nothing but a confession of our ignorance. Newton's law, then, may at present be regarded as marking out the limit of human knowledge in that direction, beyond which man's intellect cannot pierce.

It may occur to the student to ask what advantage can there possibly be in substituting a wider uniformity for a narrower one, a greater mystery for a smaller one. The answer to this is, that when we know the cause of any effect, it is often possible to imitate nature's processes, and so to produce effects that may be exceedingly beneficial to mankind. Thus, in the passage of light from one medium to another there are certain uniformities of nature exhibited. The learning of these (both effects and causes) has enabled man to produce a great number of useful optical instruments, *e.g.*, spectacles, microscopes, telescopes, and so on. In fact, as Herbert Spencer puts it, "What we call civilisation could never have arisen had it not been for science. . . . . To the progress of science we owe it that millions find support where once there was food only for thousands".*

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* Herbert Spencer's *Education*, p. 46.

Résumé of Chapter XXIV.

I. *Cause.*

1. Definition.—The antecedent or antecedents in the absence of which the phenomenon would not have occurred.
2. Law of Causation. Every effect has a cause.
3. Law of Uniformity of Nature. The same cause always produces the same effect.
4. The Law of Causation and the Law of the Uniformity underlie all human knowledge.
5. Their truth is established by an *induction per enumerationem simplicem.*

II. *Law.*

1. A *law* of the land is an imperative.
2. A *law* of nature is the assertion of a uniformity.

III. *Explanation.*

1. An explanation is a statement of the law of nature, of which the phenomenon is an example.
2. The widest known laws are inexplicable.
3. Use of explanation.
   a. It is a satisfaction to the human mind.
   b. It is of practical value, as it often suggests valuable inventions.

Exercises on Chapter XXIV.

1. What is meant by the *cause* of a phenomenon? Give instances.
2. Night is an invariable antecedent of day, therefore it is its cause. Criticise this.

3. Explain the phrase the "Uniformity of Nature".
4. Point out two common meanings of the word *law*.
5. What is meant by the *explanation* of a phenomenon?
6. What is the Law of *Causation*? On what evidence does its truth rest?
7. What assumption is always made in predicting events?
8. "Happy is he who has been able to discover the causes of things". Comment on this.

CHAPTER XXV.

Observation, Experiment, Hypothesis.

In Chapter I. it was pointed out that all human knowledge depends ultimately on knowledge gained through the senses, that is, gained by experience. Knowledge derived solely from experience is said to be *empirical*. Empirical knowledge is the ultimate foundation of every induction. In order to make this empirical knowledge as extensive as possible, recourse is had to *observation* and *experiment*. To *observe* is to concentrate attention on phenomena as they occur in nature without any attempt to modify such phenomena in any way ; to *experiment* is to modify the time, place, or circumstances generally of nature's processes in order to be able the more conveniently and the more effectively to carry on the observation of such processes.

By *observation* we gain what knowledge we can by attending to the phenomena as presented to us in nature, by *experiment* we first make the phenomena, and then *observe* it. Thus, if we attend to the phenomena of lightning and thunder as they occur in nature we are *observing*, but if by any means we generate and then discharge such a quantity of electricity that in the discharge a small flash of lightning and clap of thunder is produced we are *experimenting*. Of course, in this case we do not really create the phenomena of the lightning flash and the thunder clap ; we bring

together those natural things from the close proximity of which these phenomena result. This is true in all cases of experiment. Again, the botanist *observes* all the natural phenomena of plant life as far as possible, but he also experiments by varying the conditions under which the plant grows.

It will be noticed that *experiment* without *observation* is worthless. *Experiment* always involves *observation*. The distinction between *observation* and *experiment* as here given should be carefully remembered, but, on the other hand, it should be noticed that no hard and fast line can be drawn between them. The man who takes the trouble to get into the most favourable position in order to observe phenomena may be said to *experiment* as well as he who varies the circumstances of such phenomena so as to render them more suited for observation. Evidently, *experiment* vastly enlarges the range of observation. Experiments with the spectroscope have revealed the elements of which the sun is composed; mere observation could never have accomplished this. By experiment the identity of the lightning flash and the electric discharge in the laboratory was established, and it is difficult to see how this could have been done by observation alone. Experiment possesses also this further vast advantage over observation: that by its means we can at will produce phenomena for the production of which by nature we might have to wait years, or even phenomena which nature might never repeat, or repeat them in such a place as to be out of the reach of human observation. For example, nature has at some past period of time produced diamonds. Possibly nature is producing them at the present time, but if so, such production is going on deep down in the earth where the process cannot be observed; by the help of experiment,

however, it is not at all improbable that nature's process may be so imitated that diamonds will be produced artificially. Indeed diamonds, though not valuable ones, have already been artificially made.

Again, consider how rapidly our knowledge of the phenomena of electricity has advanced of late years. This rapid advance is due entirely to the application of experiment. If for our knowledge of electricity we had to rely on observation alone, the times at which electrical phenomena could be studied would be limited to the occasions when thunderstorms or the phenomena of the Northern Lights occur. Progress in knowledge under such conditions cannot be other than very slow. By experiment, however, the phenomena of electricity can be produced at will in the laboratory. The importance of experiment is seen by the fact that the experimental sciences (those in which our knowledge is dependent mainly on experiment, such as chemistry and physics) have advanced more during the last hundred years than they did during the preceding two thousand years, and that it is during the last hundred years that experimental enquiry has been so vastly increased. Probably one great reason why the Greeks made so little progress in the physical sciences as they did, is that they made scarcely any use of experiment.

The following extract from Sir John Herschel's *Discourse on the Study of Natural Philosophy* puts the relation between observation and experiment in a very clear light. He says:—"Experience may be acquired in two ways: either, first, by noticing facts as they occur, without any attempt to influence the frequency of their occurrence, or to vary the circumstances under which they occur; this is *observation;* or secondly, by putting in action causes and

agents over which we have control, and purposely varying their combinations, and noticing what effects take place; this is *experiment*. To these two sources we must look as the fountains of all natural science. It is not intended, however, by thus distinguishing observation from experiment to place them in any kind of contrast. Essentially they are much alike, and differ rather in degree than in kind; so that, perhaps, the terms *passive* and *active* observation might better express their distinction; but it is, nevertheless, highly important to mark the different states of mind in enquiries carried on by their respective aids, as well as their different effects in promoting the progress of science. In the former, we sit still and listen to a tale, told us, perhaps, obscurely, piecemeal, and at long intervals of time, with our attention more or less awake. It is only by after rumination that we gather its full import; and often, when the opportunity is gone by, we have to regret that our attention was not more particularly directed to some point which at the time appeared of little moment but of which we at length appreciate the importance. In the latter, on the other hand, we cross-examine our witness, and by comparing one part of his evidence with the other, while he is yet before us, and reasoning upon it in his presence, are enabled to put pointed and searching questions, the answer to which may at once enable us to make up our minds. Accordingly it has been found, invariably, that in those departments of physics where the phenomena are beyond our control, or into which an experimental enquiry from other causes has not been carried, the progress of knowledge has been slow, uncertain and irregular; while in such as admit of experiment, and in which mankind have agreed to its adoption, it has been rapid, sure and steady."

Experiment is at a disadvantage as compared with observation in all those cases in which the phenomena dealt with are *effects*, whose *causes* are being sought. Granted a certain cause we can probably put it into action and learn what its *effect* is; but given an *effect* we cannot directly experiment to discover its *cause*. In such case we have first to guess a cause, and we can generally by experiment find out the effect of our supposed cause. If the effect so obtained be the same as the given effect the supposed cause is probably the true cause of the phenomenon. This, however, is not always the case, for different causes may, and often do, produce the same effect. Thus, let the death of a man be the given effect whose cause has to be discovered. By proving that a certain cause is capable of producing death as its effect we clearly do not prove that the death in question was due to this cause. When, in order to explain some effect, we assume a cause we are said to form a *hypothesis*. A *hypothesis* is a proposition whose truth is assumed for the purpose of deducing from it a conclusion in agreement with some observed fact. More briefly a hypothesis is an imagined cause of some known effect the real cause of which is unknown. We are all constantly making hypotheses, though we may not know that we are doing so. In fact, the human mind is so constituted that in the presence of a strange phenomenon it cannot resist the impulse to frame a hypothesis by way of explanation of such phenomenon.

Thus, on hearing of the sudden death of an acquaintance, we instantly begin to imagine causes, that is, to frame hypotheses, in order to account for it. When a hypothesis is proved to be true it is no longer to be regarded as a hypothesis, but rather as a valid induction. Newton's Law

of Gravitation was at first a mere hypothesis, but is now received as one of the most certain of inductions.

Hypotheses more frequently than not turn out to be false. It is said that Kepler, in order to explain the apparent movements of the planet Mars, made no fewer than nineteen hypotheses, all of which proved false, before he made the hypothesis that Mars moved in an elliptic orbit round the sun, which was at one focus, which hypothesis turned out to be the true one. In such cases the false hypotheses should not be looked upon as useless, for they, along with the efforts spent in testing them, often prove stepping-stones to the true hypothesis.

It should be noticed that *Imagination* is the chief faculty directly exercised in framing a hypothesis.

Résumé of Chapter XXV.

I. Experience is the foundation of all knowledge. It is gained
   1. By observation.
   2. By experiment.

II. Observation.
   1. Definition.—The attending to phenomena as they occur in nature without any attempt to modify the circumstances under which they occur.
   2. Mere observation is frequently of little use for advancing knowledge, owing to difficulties of time and of the place of the occurrence of phenomena.

III. *Experiment.*

1. Definition—Is the process of modifying the circumstances under which phenomena occur in order to facilitate the observation of them.
2. Advantages—
   a. It enlarges the range of observation.
   b. By it we can produce phenomena at will which nature produces only at rare intervals.
   c. By it we produce phenomena in situations convenient for observation.

IV. *Hypothesis.*

1. Definition.—Any supposition made to explain a phenomenon whose cause is unknown.
2. A false hypothesis often leads to the true one.

Exercises on Chapter XXV.

1. What is empirical knowledge?
2. What is the object of observation and experiment?
3. Explain the difference between observation and experiment.
4. Mention three sciences carried on mainly by *observation*, and three carried on mainly by *experiment*.
5. What advantages does experiment possess over observation?
6. Does observation possess any advantage over experiment?
7. Explain the term *hypothesis*. Give examples.
8. Show how a false hypothesis may prove useful.

CHAPTER XXVI.

Classification.

In the last chapter we saw that observation and experiment are necessary to give us empirical knowledge which we may use as a foundation for our inductions. To make inductions from this knowledge it is necessary first to arrange our facts so that those most closely connected may be closest together, that is, we must *classify* the facts given by experience. To classify is to arrange objects in groups in such a way that all the individuals in any group have certain attributes in common. We are in every-day life constantly carrying on this process. Thus we classify people into those we like and those we do not like, or into rich and poor, or into English and foreign, or into adults and those not adult, and in many other ways; books we, perhaps, classify into those that are interesting and those that are uninteresting; newspapers we arrange in classes according to the interval of time between successive issues; in fact, every time we use a general term we may be said to classify. Thus, the term *tree* suggests to the mind *trees*, as distinct from all other objects, that is, for the moment we classify all objects into *trees* and *non-trees*.

In many branches of knowledge at the present day, the number of known truths is so enormous that, without the aid of classification it would be impossible to deal with them.

It is said that botanists distinguish more than 300,000 different species of plants, and that zoologists distinguish about 2,000,000 species of animals. It is very evident that the immense amount of knowledge implied in these statements could never be learned by any individual unless he could deal with it in groups.

In forming a class a certain attribute is (or certain attributes are) chosen to constitute the connotation of the class name. All objects which possess such attribute (or attributes) are placed in the class, and all objects which do not are excluded. Hence, if we know that an object belongs to a certain class, we know also that it possesses those attributes which form the connotation of the class name.

The selection of the quality (or group of qualities) the presence or absence of which is to determine whether or not an object belongs to the class, is a most important matter. This selection settles the connotation of the name of the class. What quality is selected will depend mainly upon the purpose in view; thus, the length of life of a plant is an important matter for the gardener to consider, and for him the classification of plants into *annuals*, *biennials*, and *perennials*, is a convenient and useful one; but such a classification would be of little use to the botanist because the duration of the life of a plant has no very close connection with his purpose.

It may, in fact, be given as a fundamental principle in classifying, that the classification should be appropriate to the purpose in hand. A classification which is made to depend on the presence or absence of an attribute, or group of attributes, without reference to general similarity is said to be *artificial*. This is the kind of classification carried on

in every-day life. For example, a classification of books according to colour, or according to size, is artificial.

The scientist in classifying endeavours to arrange objects in classes according to their general similarity in such a way that members of a class may be known to have many attributes in common. A classification of this kind when properly carried out is said to be *natural*. The object aimed at then in a natural classification is the bringing nearest together those objects which are, taking all things into consideration, most alike. The Linnæan system of classifying plants was an artificial one, as the position of any plant in this system depended mainly upon the number of stamens it contained, and plants essentially unlike may contain the same number of stamens, and, further, flowers, even on the same plant, not infrequently differ in the number of their stamens. Hence, in such a system, flowers essentially alike might be far removed from one another, and flowers essentially unlike might be arranged side by side in the same class. This system has consequently been discarded, and plants are now classified upon a natural system of classification.

Flowering plants are divided first of all into two classes, *dicotyledons* and *monocotyledons*, the former containing all plants whose seeds are composed of two seed lobes or cotyledons, the latter all those the seeds of which contain but one cotyledon. The *naturalness* of this division lies in the fact that dicotyledons have many other important qualities in common besides the number of cotyledons in the seeds. Thus, in dicotyledons, the parts of the flower are arranged in multiples of *four* or *five*, the veins of the leaves are reticulate, and the stems increase in thickness by the addition of successive layers on the outside ; in

monocotyledons the parts of the flower are arranged in multiples of *three*, the veins of the leaves are more or less parallel, and the stems thicken from the inside. Hence, in the first step of this classification, plants which are essentially alike are brought together into the same class, and this is also carefully carried out throughout the classification.

It is evident that in any system of classification, natural or artificial, the classes and sub-classes could not be remembered unless they were named. The names of the classes are general terms, and connote all the attributes which determine the class. The names applied to the various classes in any classification are known as a *nomenclature*. *Dicotyledons*, *calyciflorœ*, *rosaceœ*, *prunus*, *prunus spinosa* form part of the nomenclature of botany.

In addition to a nomenclature a large number of terms is usually required in any branch of science for designating the parts of, or describing, the individual objects. These terms constitute the *terminology* of the subject. Botany again supplies an excellent example of a terminology. Whewell says:—"The formation of an exact and extensive descriptive language for botany has been executed with a degree of skill and felicity which, before it was attained, could hardly have been dreamt of as attainable. Every part of a plant has been named, and the form of every part, even the most minute, has had a large assemblage of descriptive terms appropriated to it by means of which the botanist can convey and receive knowledge of form and structure as exactly as if each minute part were presented to him vastly magnified."

The following description of *Lonicera* (Honeysuckle) taken from Hooker's *Students' Flora of the British*

Islands will give some idea of the completeness of botanical terminology:—"Erect, prostrate, or climbing shrubs, with scaly buds. *Leaves*, opposite, entire, ex-stipulate, of the young shoots sometimes lobed. *Flowers* in peduncled cymes or heads, often connate in pairs by the ovaries, and subtended by connate bracheoles *Calx-tube* ovoid or sub-globose; teeth 5, often unequal. *Corolla*, tubular, funnel or bell-shaped; tube equal or gibbous at the base; limb oblique or 2-lipped, 5-lobed. *Stamens*, 5. *Disk*, humid; *Ovary*, 2-3-celled; style filiform, stigma capitulate; ovules, many in the inner angle of each cell. *Berry*, fleshy, 2-3-celled; cells few-seeded, sepha sometimes wanting. *Seeds*, ovoid or oblong, testa crustaceous".

To one ignorant of botany much of this may seem gibberish; but to the skilled botanist such a description causes a very distinct and accurate image of Lonicera to rise in the mind.

Résumé of Chapter XXVI.

I. Classification.

1. Definition.—Arrangement of objects in groups in such a way that those in the same group have certain common attributes.
2. Necessity.—Objects are so numerous as to be unmanageable without classification.
3. Rule for classification.—It must be appropriate to the purpose in hand.

II. Kinds of Classification.

1. Artificial. — When it depends simply on the presence or absence of a particular attribute.
2. Natural.—When it depends on general similarity, the most perfect example is the classification of plants.

III. Language of Classification.

1. Nomenclature.—The names of the classes in any system of classification.
2. Terminology. — The terms used in describing individual objects.

Exercises on Chapter XXVI.

1. What is classification? Why is it important?
2. How is classification an aid to induction?
3. How is the connotation of any general term connected with classification?
4. What is the difference between an *artificial* and a *natural* classification? Give examples.
5. What is meant by a *nomenclature?*
6. What is meant by a *terminology?*
7. What is the use of a full terminology?

CHAPTER XXVII.

The Canons of Inductions.

We have already seen that inductive inferences are frequently invalid, and consequently, that such inferences must be tested before they can be received as valid inductions.

Certain rules have been drawn up, setting forth the method of procedure that must be followed in order to establish valid inductions. These rules were first enunciated by Mill in his *System of Logic*, and were called by him, *canons of induction*. These we proceed briefly to explain.

The first of these canons Mill enunciated thus:—"If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon". If we pursue knowledge in accordance with this rule we are said to follow the *method of agreement*.

The method may be clearly illustrated by means of symbols. Let capital letters denote antecedents, and the corresponding small letters consequents.

Suppose the phenomena—

A,B,C,	are	followed by	the phenomena a,b,c
A,B,D,	,,	,,	a,b,d
A,B,E,	,,	,,	a,b,e
A,C,D,	,,	,,	a,c,d
A,C,E,	,,	,,	a,c,e

in accordance with the method of agreement we may assert that A and *a* are, to a high degree of probability, connected together by some causal relation.

Jevons expresses this canon more concisely in the words —"the sole invariable antecedent of a phenomenon is probably its cause". Thus, if we find out by observation or by experiment that the formation of ice is always preceded by a certain degree of cold, and that this is, as far as we can tell, the only invariable antecedent, we may conclude that almost certainly a certain degree of cold is the cause of the formation of ice. To take a more homely example, if a person notices in three or four successive years that at the end of August he is in unusually good health, and further, that the only invariable antecedent to this state of health, as far as he knows, is a month's holiday, he may conclude that in all probability the holiday is the cause of his unusually good health.

The method of agreement does not give absolutely safe conclusions. This arises from the fact already noticed that the *same* effect may be due to different causes. It is exceedingly difficult, or, in many cases impossible, to carefully observe *all* the conditions of a phenomenon, and there is always the possibility, if the method of agreement only is employed in the investigation, that the cause is one of the unobserved circumstances. In the symbolic illustration of the method given above it may be that the fact that in all the observed cases *a* is preceded by A is a mere coincidence, and that the real cause of *a* is Z, a circumstance which has escaped notice. Hence, when a probable conclusion has been reached by the method of agreement, a further test must be applied before the conclusion can be wholly relied on. This test is supplied by

Mill's canon of his method of difference. This is:—"If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former; the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon".

This may be illustrated thus: suppose the set of antecedents A, B, C, D, be followed by the consequents *a*, *b*, *c*, *d*: and further that B, C, D, be followed by *b*, *c*, *d*, then this canon asserts that A and *a* are causally related. It is clear *a* may be the effect of A, for it follows it in time, and that *a* cannot be the effect of B, C, or D, for *a* is absent when these are present; further, supposing A, B, C, D, are the only antecedents of *a*, then *a* must be the effect of A, B, C or D; therefore it is the effect of A.

We know a candle burns in the air, and hence among the antecedents of the burning candle is the presence of oxygen. To prove that oxygen is the cause of the burning of the candle we must remove oxygen from the air so that the presence of oxygen may not be an antecedent of the burning of the candle. This can easily be done experimentally, and then it is found that the candle no longer burns. The first part of the process, the observation of the fact that whenever a candle burns oxygen is present, leads by the method of agreement to the probable conclusion that oxygen is the cause of the candle burning; the second part of the process, the elimination of oxygen from among the antecedents and the observation that the candle then fails to burn, is an application of the method of difference and gives us the sure conclusion that the presence of oxygen and the burning of the candle are causally connected.

The method of difference is essentially a method of experiment for in experiments we generally produce phenomena in such a way that any given antecedent may be totally or partially eliminated.

Mill's third canon is :—" If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of circumstances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon ".

Suppose we observe on many different occasions that A is always followed by *a ;* and, further, suppose we notice that sets of antecedents which do not include A are invariably followed by sets of consequents from which *a* is absent, then this canon says that almost certainly A is the cause of *a*.

Thus, if we observe on many occasions that the roads become exceedingly dry, consequent upon an east or north-east wind, and that they seldom dry (the canon strictly applied would require that they should *never dry*) so quickly when the wind is in any other quarter, we may feel pretty sure that the rapid drying of the streets and the blowing of the east wind are connected by some causal relation. This is merely a method of combining the method of agreement and the method of difference, and Mill consequently called it the *joint method of agreement and difference.*

The canon of the fourth method of inquiry is :—" Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents ". This is called the *method of residues.*

To illustrate this symbolically, suppose the antecedents A, B, C are found to be followed by the consequents *a*, *b*, *c*; suppose, further, that we have already proved B to be the cause of *b*, and C of *c*, then, in accordance with this canon, A is the cause of *a*. This method is largely followed in the pursuit of those branches of science to which mathematics has been applied. Especially is this the case with astronomy. Herschel, in his *Outlines of Astronomy*, says:—

"Almost all the greatest discoveries in astronomy have resulted from the consideration of what we have elsewhere termed *residual phenomena*, of a quantitative or numerical kind, that is to say, of such portions of the numerical or quantitative results of observation as remain outstanding and unaccounted for after subducting and allowing for all that would result from the strict application of known principles. It was thus that the grand discovery of the precession of the equinoxes resulted, as a residual phenomenon, from the imperfect explanation of the return of the seasons by the return of the sun to the same apparent place among the fixed stars".

Soon after the discovery of the planet Uranus, it was noticed by astronomers that this planet presented an irregularity or perturbation in its orbit which could not be accounted for by any or all of the known forces acting on it. The cause of this residual effect was surmised to be another planet whose position was calculated from the observed amount of the perturbation of the orbit of Uranus. Observation showed this calculation to be surprisingly accurate, for on turning his telescope to the point of the sky where it was calculated the unknown planet must be, Dr. Galle, of Berlin, immediately found the planet now

known as Neptune. The discovery of Neptune is a remarkable instance of the extension of knowledge possible as a result of reasoning methodically carried out.

The canon of the fifth method, the *method of concomitant variations*, Mill enunciated thus:—"Whatever phenomenon varies in any manner, whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation".

This method is applicable in those cases in which we cannot totally eliminate any given antecedent, but can cause such antecedent to vary in intensity. Thus, it is impossible to eliminate from a material substance *all* the heat contained therein, but the quantity of heat in such substance can be made to vary, and it is found that in every case, when the quantity of heat varies, there is an accompanying or concomitant variation in the volume of the substance. Hence this canon justifies the conclusion that increase of heat and increase of volume are connected by some causal relation.

Another application of this method of concomitant variations is what is frequently referred to as the *historical method*. This is applied mainly in ethical and political science, and has received the name *historical* because history is called upon to supply data which otherwise would be unattainable. "A certain institution, custom, or opinion is traced throughout various stages of society, and its growth or decline is connected with that of some other institution, custom, or opinion, or with the general state of civilisation prevalent throughout these periods, it being argued in the latter case that, as civilisation advances, the institution, custom, or opinion has grown or

declined as the case may be".* Many of our existing institutions have been explained by this method. Thus, the modern state has been shown to be a development and extension of the family government of patriarchal times.

The student who wishes for a fuller discussion of these canons of induction should read Mill's *Logic*, Book III., Chapters 8 and 9.

Résumé of Chapter XXVII.

The canons of the inductive methods are :—

1. The method of agreement.—If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon.
2. The method of difference.—If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former circumstances in which alone the two instances differ, is the effect, or the cause, or an indispensable part of the cause of the phenomenon.
3. The joint method of agreement and difference.—If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the

* Fowler's *Inductive Logic*, p. 201.

absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect or the cause, or an indispensable part of the cause of the phenomenon.

4. The method of residues.—Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.
5. Method of concomitant variations. — Whatever phenomenon varies in any manner, whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.

Exercises on Chapter XXVII.

1. Explain why it is that a conclusion based on the method of agreement may be invalid.
2. Which of the inductive methods gives the most certain conclusions ?
3. Illustrate the joint method of agreement and difference.
4. Why is the method of concomitant variations indispensable in scientific inquiry ?
5. Illustrate the application of the method of concomitant variations.
6. Is *deduction* made use of in any of the inductive methods of inquiry ?

CHAPTER XXVIII.

Analogy.

Similarity or likeness is the ground of all reasoning. When we observe that many things agree in possessing certain attributes, and hence conclude that all the things of the same class possess those attributes, our conclusion is an induction; but when we compare two objects, and find that they have many attributes in common, and then, on finding that one of the objects has another attribute we infer that the other has also the same attribute, our argument is an *analogical* one. For example, knowing many points of resemblance between the Earth and Mars, and knowing further that the Earth is inhabited, we may infer from analogy that Mars also is inhabited. In this case, however, no one would place very great reliance on our conclusion.

An argument from analogy gives at best only probable conclusions. The degree of probability of any analogical inference depends on two things—

1. The relative number of known points of resemblance between the two objects to the number of known dissimilarities between them.
2. The importance of the resembling attributes in the two objects.

This second point is, however, difficult to determine and presupposes such a knowledge of the two objects as to leave

little room or need for any analogical argument from one to the other. Consequently in reasoning from analogy we have to rely mainly on the relation between the number of known similarities to the number of known dissimilarities between the two objects. In fact the fraction—

$$\frac{\text{Number of known points of resemblance between A and B}}{\text{Number of known points of disagreement between A and B}}$$

may be regarded as a more or less accurate measure of the probability of any conclusion regarding B based on an argument from analogy with A.

If we know that A resembles B in four ways and that A differs from B in four ways, we can infer nothing by analogy, but if A is known to agree with B in five points and to disagree in only three, we may infer from analogy that any additional fact m known to be true of A is more likely than not to be true of B also.

If our inference is to be purely one from analogy, the known common properties of A and B must not be known to be entirely unconnected with m, for if they are, their presence or absence can in no way affect the probability of the presence of m; nor must they be known to be connected with m by some causal relation, for in that case the argument ceases to be one from analogy and becomes inductive or deductive.

Thus, if we argue that because Mars resembles the Earth in having large patches of ice and snow round the poles, as well as in many other respects, therefore Mars resembles the Earth in having an atmosphere, our knowledge that Mars possesses an atmosphere is not due merely to analogy, for we know deductively that wherever there is snow there must be an atmosphere. Conclusions drawn from mere analogy are never to be trusted until such conclusions have

been tested by the method of induction. A man knows a mushroom is good to eat; he sees a fungus that resembles a mushroom very closely, and concludes from analogy that it is also good to eat; he eats it, and is poisoned.

The known points of resemblance between two objects are, however, sometimes so many and so great, that, knowing any fact of the one, we do not for a moment hesitate to assert the same fact of the other. Thus, suppose a new plant to be found presenting a thousand points of resemblance to the deadly nightshade, and only one known point in which it differed from it, the probability that its berries would be poisonous would be a thousand chances to one. Such a conclusion may well be compared with one reached by an *inductio per enumerationem simplicem*. The student should never rest satisfied with such inferences, but should in all cases endeavour to test them by the canons of induction. The great use of analogy is to suggest provisional conclusions to which to apply the canons of induction.

The term *analogy* has been used so far as connoting any resemblance whatever. It is, however, sometimes used in the restricted sense of a *resemblance of relations*. Thus, when a colony speaks of England as the *mother* country it is implied that the relation existing between the colony and England resembles, or is analogous to, the relation existing between a daughter and her mother. There is not much resemblance between a gardener and a teacher, or between a plant and a child; the relation, however, between the gardener and the plant is in some respects *analogous* to the relation between the teacher and child.

Résumé of Chapter XXVIII.

Analogy.

1. Definition.

   An argument from analogy is one based on any resemblance whatever.

   A resembles B in many respects, it probably does so in any other respect.

2. Difference between analogy and induction.

   a. Induction gives sure conclusions, analogy does not.

   b. Induction is reasoning that what is known of some members of a class is true of all the class ; inference by analogy is reasoning that an attribute belonging to one object also belongs to another object known to resemble it in certain respects. An analogical inference is frequently a mere preliminary to induction.

3. In reasoning from analogy the known similarities or dissimilarities must not be known to be connected or unconnected with the inferred fact.

4. Analogy is sometimes defined as a resemblance of relations.

Exercises on Chapter XXVIII.

1. Give an example of an argument from analogy, giving—

   a. A very doubtful conclusion.

   b. An almost certain conclusion.

2. What is the meaning of analogy ?

3. It is said that gold was discovered in Australia by a Californian who was struck with the apparent likeness between the rocks of Australia and the gold-bearing rocks of California. What kind of argument did he use? Answer fully.
4. Give an analogical argument to prove that the earth rotates on its axis.
5. On what does the strength of an argument from analogy depend?
6. What is a false analogy?

CHAPTER XXIX.

Relation between Induction and Deduction.

We have already (see Chapter XXIII.) seen that deduction depends on previous induction. In every syllogism the major premiss makes a general assertion. This general assertion may be the conclusion of another syllogism, and so depends for its truth on a wider statement, which again, may depend on a still wider fact; but if we trace back the foundation of the statement sufficiently far, we shall at length find that it ultimately is based on an assertion which cannot be the conclusion of a syllogism, and which must, therefore, be established by induction. Further, the premisses of an inductive argument are facts supplied by experience; hence, all our knowledge is ultimately derived from experience. Sir John Herschel says:—"We have thus pointed out to us, as the great, and indeed only ultimate, source of our knowledge of nature and its laws, *experience;* by which we mean, not the experience of one man only, or of one generation, but the accumulated experience of all mankind in all ages, registered in books or recorded by traditions".*

This explains why it is that the different branches of science tend to become more and more deductive. Fundamental

* *Discourse on the Study of Natural Philosophy*, p. 67.

principles are first established by experience, and then these are used as premisses for deductive arguments. Those sciences in which experience has already supplied all the necessary fundamental principles, and the progress of which, therefore, is due entirely to deductive reasoning, are often called the *deductive sciences*, and if their fundamental principles are established so as to admit of no doubt they are then frequently spoken of as the *exact sciences*. The best type of an exact science is some branch of mathematics, *e.g.*, the science of geometry. Mathematics, since all reasoning in it is based upon a few fundamental facts established by experience, is entirely deductive; hence the gradual application of mathematical reasoning to any branch of science marks its progress towards the *deductive* or *exact* stage.

On the other hand those branches of science, the progress of which is due mainly to the gaining of additional facts by experience (by observation and experiment), are called the *inductive sciences* or the *experimental sciences*. The physical sciences, such as heat, light, sound, electricity, chemistry, are regarded as the inductive or experimental sciences *par excellence*; but in the last few years much of the advance made in these has been due to the application to them of mathematics; in other words, even the typically inductive sciences are no longer purely inductive.

When any branch of study is pursued inductively the *method of discovery* is said to be followed. The position of the student is in such a case analogous to that of the discoverer, seeing that he is in the midst of a mass of particular facts of experience from which he has to discover the general underlying truths. To accomplish this he must collect, arrange, and analyse his facts. To analyse

is to break up complex phenomena into simpler ones. Thus the inductive inquirer following the method of discovery tries to understand the complex phenomenon of vision. His first step is *analysis*. He analyses the phenomenon into several simpler phenomena which may be separately studied. In every case of vision the following points have to be considered—

1. The luminosity of the object seen.
2. The transmission of the effect from the object to the eye.
3. The action of the eye.
4. The action of the retina.
5. The transmission of the retinal disturbance to the brain.
6. The transition from a material brain disturbance to the mental phenomenon of vision.

He then proceeds to study these phenomena separately. One may compare his position to that of a man who wants to break a bundle of rods. So long as they are together in a bundle, to break them is impossible; but let the bundle be broken up (analysed) into the individual rods and each can separately be broken. This method is frequently referred to as the *à posteriori* method, for, by following it, we reason from what comes after, or from effects, to what goes before, or to causes.

The *method of discovery* may be regarded as a synonym of the *inductive method; analysis* is one of the steps taken in following that method; and the reasoning involved is *à posteriori*. The *deductive method* is sometimes called the *method of instruction*. It proceeds from general principles to particular cases, from causes to effects, from what proceeds to what follows. Hence, the reasoning is often called

à priori. An *à priori* argument is one based on some previous general principle assumed to be true. The danger in an *à priori* argument is that our ultimate assumption may be wrong. Conclusions reached *à priori*, are to be trusted only when we know that the assumptions involved are established inductions. Conclusions reached *à priori* should always be brought to the test of experience; when such conclusions are found to tally with the facts of experience, we may feel quite confident of their truth. Thus, taking for granted what psychology has to teach concerning the constitution and development of the human mind, we may, by an *à priori* argument, reach the conclusion that in teaching children the right method is to begin with the concrete and proceed thence to the abstract.

This *à priori* conclusion is found to agree with the conclusion reached by practical teachers from their own experience, or *à posteriori*. We may, therefore, regard the conclusion as a perfectly safe one. As the scientific inquirer in induction makes use of *analysis*, so in deduction he makes use of *synthesis*. By logical *synthesis* is meant the building up of complex structures of knowledge out of simple general principles. The best possible example of this is the Geometry of Euclid. Euclid starts with a few definitions and axioms, and proceeds to build up on these, as foundation, the whole structure of his Geometry.

Résumé of Chapter XXIX.

I. Relation between induction and deduction. The ultimate premisses of all deductive arguments depend for their truth upon induction.

II. Induction.

1. The method of inquiry, by means of induction, is called the *method of discovery*.
2. The inductive method proceeds *analytically*, that is, it breaks up complex phenomena into simpler phenomena for individual consideration.
3. The inductive method is an *à posteriori* one, that is, it proceeds from what is after to what goes before, from effect to cause.

III. Deduction.

1. The method of inquiry by means of deduction is called the *method of instruction*. It proceeds from cause to effect, from rule to example, or from general principle to illustration.
2. The deductive method proceeds *synthetically*, that is, it builds up simple facts into complex structures of knowledge.
3. The deductive method proceeds *à priori*, that is, from what goes before to what follows.

Exercises on Chapter XXIX.

1. Which is more important, induction or deduction? Why?
2. Explain what is meant by an *à priori* argument.
3. Explain what is meant by an *à posteriori* argument.
4. What is *analysis?* Give examples.
5. What is *synthesis?* Give examples.
6. What is meant by an *exact science?*

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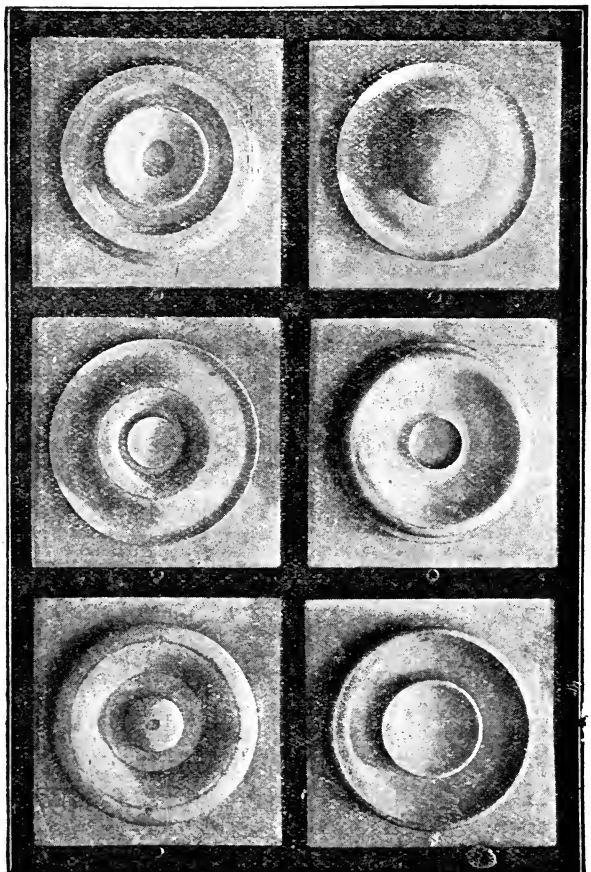

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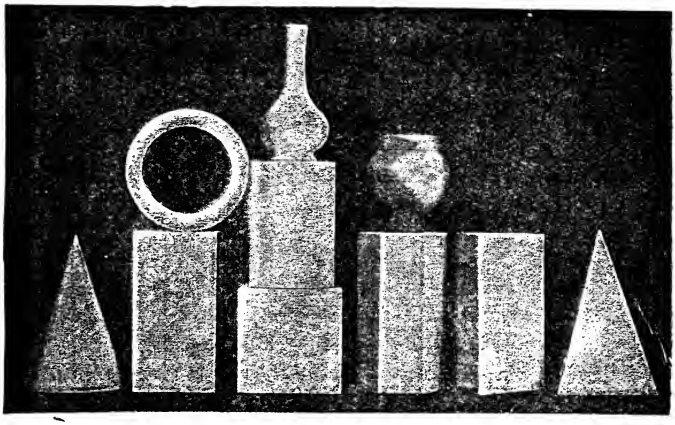

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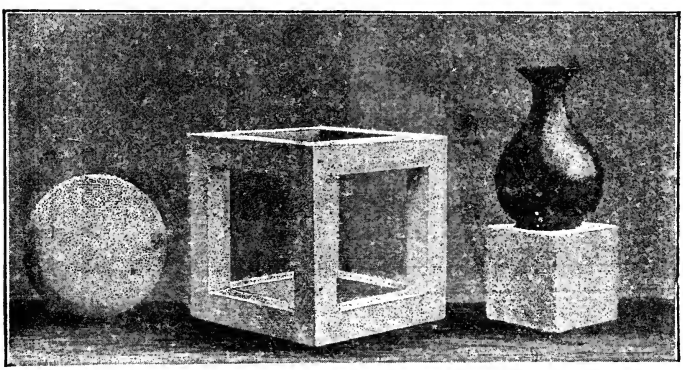

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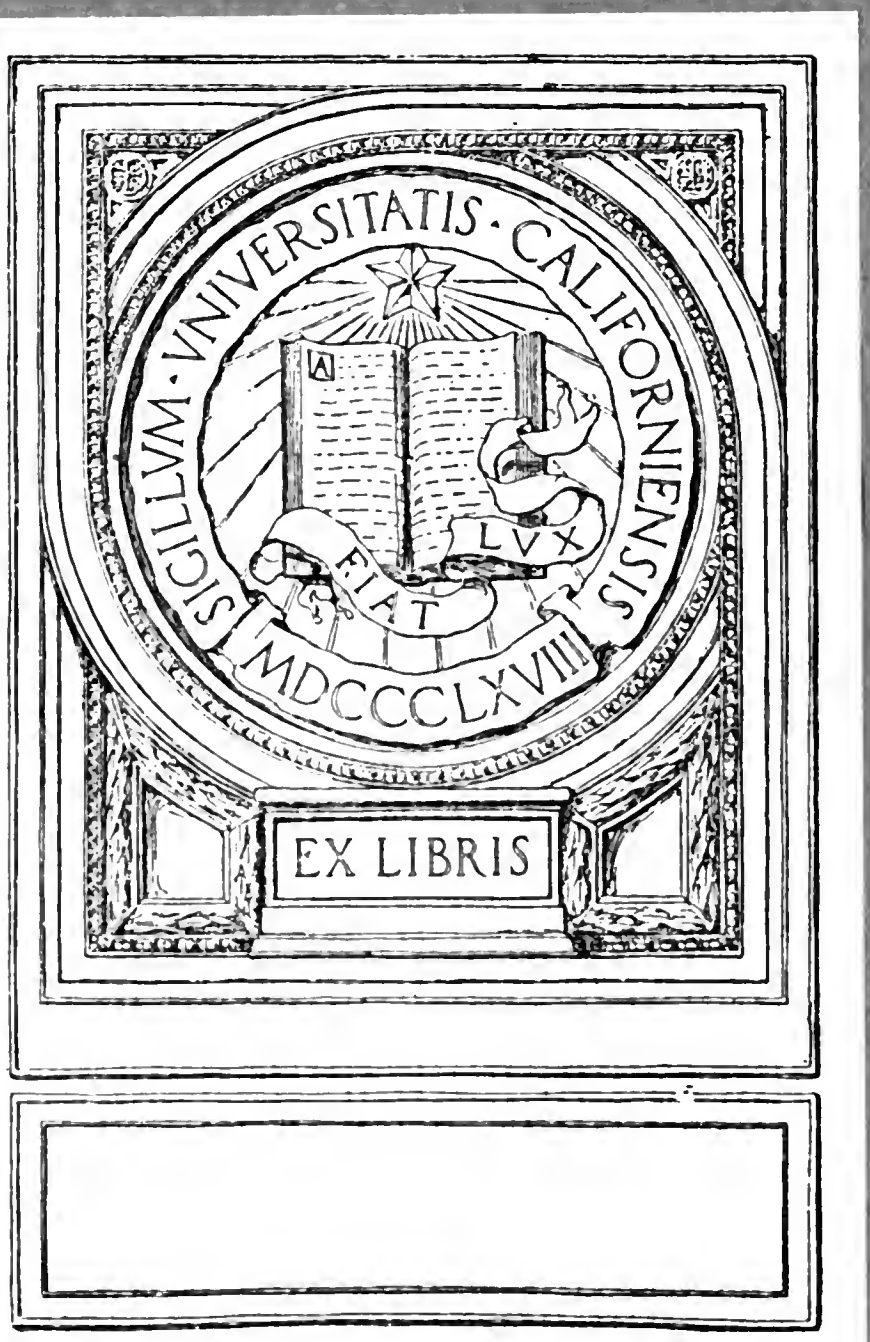
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PREFACE.

THE age may be characterized as one of *unsettled* opinion. Our ambitious youth are not satisfied with the past, its opinions and practices. Authority is not worshipped by them; they have no partiality for creeds and confessions. They do not accept, without first doubting, the truths supposed to be long established. In searching into the foundation of the old temples, they have raised a cloud of dust and left lying a heap of rubbish. It is an age out of which good and evil, either or both, may come according as it is guided. We may entertain fears, for it is dancing on the edge of a precipice down which it may fall. We may cherish hope, for it is an inquiring age.

Every form and phase of opinion seeks to have a philosophy, in which it may embody and express itself and by which it may be defended. Agnostics is the shape or figure which the doubting and hesitating spirit takes. It is not a new heresy. It has been held by a few in every age; it is now espoused by many, provisionally, till something more solid or showy is propounded. It used to be called Nescience, which maintains that nothing can be known, and Nihilism, which holds that there is nothing to be known. It is of little use trying to argue with it, for it

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allows us no premises as a ground on which to start, and has no body or substance that we can attack. It is easy to show that it is suicidal. It is an evident contradiction to affirm that we can know nothing. But when we have demonstrated this we have not destroyed it any more than we have killed a spectre by thrusting a spear into it; for its defence is, that all truth is contradictory. The best way of dealing with it is to allow it to dance as it may, like the shadows of the clouds, and, meanwhile, to found and build up truth and set it up before the mind, that it may be seen in its own light. It is well known that when we see a solid object through and beyond a spectre, the spectre melts away and disappears. So it will be with agnosticism—it will vanish when we fix our eyes upon the truth. This is what is attempted in this little treatise.

The work is expository, and, for the reasons just hinted at, is not controversial. It is meant for those who wish, for their own satisfaction, to know the foundations on which the truth which they are required to believe rests. It is also hoped that, it being a treatise on what Kant calls Applied Logic—which may be made quite as useful as Primary or Formal Logic—it may be used as a text-book.

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INTRODUCTION.

We have truth when our ideas are conformed to things. The aim of this work is to show that there is truth, that truth can be found, and that there are tests by which we may determine when we have found it. We do not propose to guide inquirers in any particular department of investigation; this can best be done in introductions to the books and lectures treating of the several branches of knowledge.

Kant and the German metaphysicians have shown again and again that there is no one absolute criterion to settle all truth for us; that will determine, for example, at one and the same time, whether there is a fourth dimension of space; whether the planet Jupiter is inhabited; where the soul goes at death, and what kind of crops we are to have next year. But it can be shown that there are truths which may be ascertained, and that there are criteria which prove when they are so, and these clear, sure, and capable of being definitely expressed. But the test which settles one truth for us does not necessarily settle all others, or any others. It is necessary to distinguish between different sorts of truth, and we should be satisfied when we find a test of each kind. The aim of the criteria, it should be noticed, is not to help us to discover truth, but to determine when we have found it.

The work is divided into two Parts: one in which we seek to find the Criteria of First Principles, and in the other the Criteria of Individual Facts and their Laws.

PART FIRST.

CRITERIA OF TRUTHS TO BE ASSUMED.

SECTION I.

FIRST AND FUNDAMENTAL TRUTHS.

The mind must start with something. There are things which it knows at once. I know pleasure and pain. I do more: I know myself as feeling pleasure and pain. I know that I am surrounded with material objects extended and exercising properties. I know by barely contemplating them that these two straight lines cannot contain a space. These are called first truths. There must be first truths before there can be secondary ones; original before there can be derivative ones. Can we discover and enunciate these? I believe we can.

We are not at liberty, indeed, to appeal to a first principle when we please, or because it suits our purpose. When we are left without evidence, we are not therefore allowed to allege that we need no evidence. When we are defeated in argument, we are not to be permitted to escape by falling back on what is unproved and unprovable. It is true that we cannot prove everything, for this would imply an infinite chain of proofs every link of which would hang on another, while the whole would hang on nothing—that is, be incapable of proof. We cannot prove everything by mediate evidence, but we can show that

we are justified in assuming certain things. We cannot prove that two straight lines cannot enclose a space, but we can show that we are justified in saying so. We can do so by the application of certain tests.

SELF-EVIDENCE is the primary test of that kind of truth which we are entitled to assume without mediate proof. We perceive the object to exist by simply looking at it. The truth shines in its own light, and in order to see we do not require light to shine upon it from any other quarter. We are conscious directly of self as understanding, as thinking, or as feeling, and we need no indirect evidence. Thus, too, we perceive by the eye a colored surface, and by the muscular touch a resisting object, and by the moral sense the evil of hypocrisy. The proof is seen by the contemplative mind in the things themselves. We are convinced that we need no other proof. A proffered probation from any other quarter would not add to the strength of our conviction. We do not seek any external proof, and if any were pressed upon us we would feel it to be unnecessary—nay, to be an encumbrance, and almost an insult to our understanding.

But let us properly understand the nature of this self-evidence. It has constantly been misunderstood and misrepresented. It is not a mere feeling or an emotion belonging to the sensitive part of our nature. It is not a blind instinct or a belief in what we cannot see. It is not above reason or below reason; it is an exercise of primary reason prior, in the nature of things, to any derivative exercises. It is not, as Kant represents it, of the nature of a form in the mind imposed on objects contemplated and giving them a shape and color. It is a perception, it is an intuition of the object. We inspect these two straight lines, and perceive them to be such in their nature that they cannot enclose a space. If two straight

lines go on for an inch without coming nearer each other, we are sure they will be no nearer if lengthened millions of miles as straight lines. On contemplating deceit we perceive the act to be wrong in its very nature. It is not a mere sentiment, such as we feel on the contemplation of pleasure and pain; it is a knowledge of an object. It is not the mind imposing or superinducing on the thing what is not in the thing; it is simply the mind perceiving what is in the thing. It is not merely subjective, it is also objective—to use phrases very liable to be misunderstood; or, to speak clearly, the perceiving mind (subject) perceives the thing (object). This is the most satisfactory of all evidence; and this because in it we are immediately cognizant of the thing. There is no evidence so ready to carry conviction. We cannot so much as conceive or imagine any evidence stronger.

Necessity is a secondary criterion. It has been represented by Leibnitz and many metaphysicians as the first and the essential test. This I regard as a mistake. Self-evidence comes first, and the other follows and is derived from it. We perceive an object before us and we know so much of its nature; and we cannot be made to believe that there is no such object, or that it is not what we know it to be. I demur to the idea so often pressed upon us that we are to believe a certain proposition because we are necessitated to believe in it. This sounds too much like fatality to be agreeable to the free spirit of man. It is because we are conscious of self that we cannot be made to believe that we do not exist. The account given of the principle by Herbert Spencer is a perverted and a vague one: all propositions are to be accepted as unquestionable whose negative is inconceivable. This does not give us a direct criterion, as self-evidence does, and the word inconceivable is very ambiguous. But necessity, while it is not

the primary, is a potent secondary test. The self-evidence convinces us; the necessity prevents us from holding any different conviction.

Universality is the tertiary test. By this is meant that it is believed by all men. It is the argument from catholicity, or common consent—the *sensus communis.* All men are found to assent to the particular truth when it is fairly laid before them, as, for instance, that the shortest distance between two points is a straight line. It would not be wise nor safe to make this the primary test, as some of the ancients did. For, in the complexity of thought, in the constant actual mixing up of experiential with immediate evidence, it is difficult to determine what all men believe. It is even conceivable that all men might be deceived by reason of the deceitfulness of the faculties and the illusive nature of things. But this tertiary comes in to corroborate the primary test, or rather to show that the proposition can stand the primary test which proceeds on the observation of the very thing, in which it is satisfactory to find that all men are agreed.

Combine these and we have a perfect means of determining what are first truths. The first gives us a personal assurance of which we can never be deprived; the second secures that we cannot conquer it; the third that we can appeal to all men as having the same conviction. The first makes known realities; the second restrains us from breaking off from them; the third shows that we are surrounded with a community of beings to whom we can address ourselves in the assurance of meeting with a response.

But in order to be able to apply these criteria properly we must carry along with us certain explanations and limitations.

1. It should be noticed of intuitive truths that they are,

in the first instance, *individual* or *singular*, and that we need to generalize the single perceptions in order to reach general maxims. In them we begin with contemplating a single object, say an external object, and know it to be extended and solid, or an act of benevolence and know it to be good, or an act of cruelty and proclaim it to be evil. But we can generalize the individual perceptions, and then we have general maxims or axioms, which we can apply to an infinite number of cases. We perceive that these two parallel lines will never meet; and we are sure that we should affirm the same of every other set of parallel lines, and hence we reach the general maxim that parallel lines will never meet. We perceive, on the bare contemplation of this deed of deceit, that it is base, but we would feel the same of every other deed of deceit, and hence the maxim deceit is evil. But it should be observed that in the formation of these general principles there is a discursive act, in the shape of a generalizing process, involved. It is here that there may creep in error, which is not in the intuitive but in the discursive process; for we may form a partial, a one-sided, or exaggerated generalization. Thus, on discovering a particular effect we at once judge or decide that it has a cause. But when we would make the principle universal we may fall into a mistake, and declare that "everything has a cause," which would require an infinite series of causes and make it necessary to hold that God himself has a cause. In such a case our generalization is wrong. But let the maxim take the form that "everything which begins to be has a cause," and we perceive that on a thing presenting itself to us as beginning we should proclaim it to have had a producing power. We thus see that there may be both truth and error in our metaphysical or moral maxims: truth in the primitive perception at the basis of the whole, while there may be hastiness leading to mutilation in the ex-

pression. Hence the wrangling in metaphysics. Thus, everybody acknowledges that two parallel lines can never meet, but there may be disputes as to the fit form in which to put the axiom. So, in regard to the generalized principles that every effect has a cause, that every quality implies a substance, that virtue is commendable, there may be a difficulty in expressing exactly what is meant by cause and effect, what by substance and quality, and what by virtue and moral good; and we may find that when we would make the expressions definite we fall into grievous mistakes, and this while we are certain that there is a self-evident, necessary, and universal truth if only we can seize it.

2. First truths are of various kinds, which we shall endeavor to classify. Some of them are

Primitive Cognitions. In these the object is now before us, and is perceived by us. We perceive that this body has three dimensions in space, and cannot be made to believe otherwise. We decide that this thing, material or mental, cannot be and not be at the same time; that these two things, being each equal to the same thing, are equal to one another. In these cases the object is perceived at once and immediately. But there are others in which the object is not present, and the convictions may be regarded as

Primitive Beliefs. Here there is still an object. It is not present, but still it is contemplated. We have known the object somehow, and on conceiving it beliefs become attached to it. Thus, we know time in the concrete, and in regarding it we believe that time is continuous, that time past has run into time present, and that time present will run into time to come. A number of such faiths gather round our primitive cognitions and widen them indefinitely. We see two points in space; we are sure that there is

space between, and that the shortest line between the two is a straight line. We can rise to still higher faiths. We believe of certain objects, say space and time, and God—when we come to know him—that they are infinite, that is, that they are always beyond our widest image or concept and such that nothing can be added to or taken from them. The senses cannot give us these beliefs, nor can the understanding construct them out of the materials supplied by the senses. Some of them, such as the idea of the infinite, the perfect, lift us above our immediate experience into a higher sphere. We begin in all such cases with realities perceived or apprehended; and we are sure, if we proceed ligitimately, that we end with realities. It should be remarked that in order to our having these cognitions and beliefs it is not necessary to express them or even put them in the shape of propositions. It is necessary first to have cognitions or beliefs regarding them before we form comparisons of them or affirm that they exist or possess certain properties. But out of these we can form

Primitive Judgments, in which we predicate—that is, make affirmations or denials—or discover certain properties or relations, as when we say space and time are without bounds and exist independent of the contemplative mind. In order that these judgments may be primitive they must be pronounced as to objects which have been perceived by intuition.

I ought here to add that the mind is capable of perceiving at once certain moral qualities, and we have

Moral Cognitions, Beliefs, and Judgments. On contemplating an act of self-sacrifice done for a friend or a good cause we know it at once to be good, or an act of selfishness we perceive it to be evil. When these acts are done by our neighbors we cannot notice them directly, but we are sure that they are good or evil; and these may be

regarded as beliefs. When we put them in propositions we exercise judgment, as when we declare that sin deserves punishment.

But it will be asked, do we perceive the good and evil to be a reality, to be in the very thing. It might be allowed, it is urged, that intuitively we perceive matter to be extended and that two straight lines cannot enclose a space; for the matter, and the straight lines are before us. But moral excellence and depravity have no such reality, they exist only in our conceptions. To all this I reply that we have the acts before us in the one case as in the other; we have before us every day a deed and an implied affection of benevolence or of cruelty, and in it we perceive the morally good or the morally evil. The benevolence in this act of charity has a reality quite as much as the hand that bestows the alms or the alms bestowed. The malevolence in this calumny is a reality, quite as much as the tongue that uttered it or the newspaper that published it. The reality is of a different kind, no doubt, but it is of a kind which all acknowledge when they approve of the charity and disapprove of the scandal, and perhaps impose a penalty upon the person who has been guilty of it.

It is of vast moment, to ourselves and to the community, that we and all others should acknowledge, theoretically and practically, that there are other realities besides those of sense, and these higher and more enduring. It is the worst influence of the prevailing agnosticism that while it can have little power to keep us from believing in the things that are seen, it may have a mighty influence in keeping us from believing in and realizing the things that are spiritual, and therefore unseen, but eternal. The idealist errs when he denies the reality of a material world which, though temporal, is real. But the sensualist errs far more egregiously when he denies the existence of a spiritual

world, which is real and eternal. It should be the aim of the highest philosophy to carry us up, as Plato endeavored to do, to this high and pure region which has as high an existence as the heavens, which are its special dwelling-place. We should train ourselves, and especially train the young, to retreat from time to time into the higher world, that they may there hold communion with all that is great and good and elevating.

3. The complexity of our mental states places difficulties in the way of our applying the criteria. There are opinions which have been acquired by a lengthened and constant observation, which association has wrought into our very nature, so that we feel as if they are native and necessary; and yet some of them may be mere hereditary or popular prejudices which have no warrant in reason. In particular, experiential truths or even fancies and prejudices may so mingle with our intuitions that it seems impossible to separate them and determine which is the self-evident principle in the complex notion. These circumstances, it should be admitted, do throw difficulties in the way of the application of our criteria. But these are not greater, after all, than the application of tests in any other department of knowledge, as, for example, chemical tests to determine the existence of poisons in very complex mixtures, and generally the verification of scientific discoveries of every description. But, in spite of these difficulties, the tests can be applied if only pains be taken to distinguish the things that differ and to lay aside the things that are irrelevant. It is possible, by a careful discrimination, to separate the associated from the primitive judgment, and thus seize the conviction that is native and necessary and apply the tests to it.

4. In many instances it is essential to apply the tests to alleged intuitive truths before we put trust in them. In

some cases, indeed, the spontaneous belief is so clear and assured that we may follow it without instituting any reflex examination. But in other cases the supposed necessary truth may be mixed with extraneous matter which adulterates it. Every one acknowledges that for the purposes of accurate science it is of importance to have the axioms of mathematics and mechanics so enunciated that no empirical element has entered. In morals and jurisprudence evil consequences might arise from mixing up doubtful principles with true ones, from assuming, for instance, that the promotion of happiness is the sole and essential quality of virtue. Without a sifting we might often be tempted by indolence or prejudice to assume as true what ought to be proven, or what, in fact, cannot be proven. It is of special importance to apply these tests to all those higher faiths which perform so important a part in mystic philosophy and theology. In these there is commonly a real intuition, and this, possibly, of an elevating, inspiring order as a nucleus; but around this there may gather a halo consisting merely of mist irradiated by the light in the centre. All high minds have felt the influence of these faiths, and some have been transported by them. But earthly ingredients are apt to mingle with the ethereal and heavenward aspirations, and claim all the authority which these have. The gilding gold is made to give currency to the coin. Truth and error thus come to be hopelessly intermixed, and visions of fancy come to be regarded as revelations of heaven. The sceptic detects this, and in pulling up the tares he uproots the wheat; to vary our illustration, in tearing down the creepers he pulls asunder the wall on which they grow. These results are to be avoided by a reflex examination of the whole mental exercise. The idea of Plato, the ecstacy of the Alexandrians, the perfect of Descartes,

Malebranche's vision of all things in God, the absolute of Kant, Schelling, and Hegel, the supposed inspirations of poets and the revelations to prophets who utter grand truths—all these point to and imply high realities; but they are liable to run into fancies and extravagances, into follies and deceptions, which mislead and delude those who believe in them, pervert their judgments, and render them ridiculous in the view of the world. There is gold in the mine, and all we have to do is, by crucial tests, to separate it from the dross that we may have the true metal.

SECTION II.

REASONED TRUTHS.

When we have got truth by self-evidence or by observation, we may add indefinitely to it by inference, in which we proceed from something given or allowed to something else derived from it by the mind contemplating it. If we have truth and reality in what we start with, and if we reason properly, we have also truth and reality in what we reach. Of course if what we assume be fictitious, what we arrive at may be the same. These inferences may be of three kinds, each of which has its tests.

Immediate Inferences, or what I am disposed to call *implied judgments*. Here we have a judgment given, and we derive other judgments merely from contemplating the two notions compared. All general concepts, as logicians know, have both extension and comprehension. The extension has reference to the objects in the class; the comprehension to the qualities which combine them. Now, on the bare contemplation of the extension of the concepts we can draw certain inferences, as when it is granted that

"all men have a conscience" we infer that "this man has a conscience," even though he be a liar. From the same proposition we can draw the inference in comprehension that the possession of a conscience is an attribute of man. The canon is that whatever is involved in the extension and comprehension of a notion may be legitimately inferred.[1]

MEDIATE REASONING.—Here we do not discover the relation of two notions, or, as we call them when expressed in language, terms, by directly comparing them, but we can do so by means of a third term which has a connection with both. Reasoning thus consists in comparing two notions by means of a third. The canon of reasoning in its most general form is, "Notions which agree with one and the same notion agree with one another," with a

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[1] From the proposition "men are responsible" the following may be drawn:

In Extension.

Every man is in the Class Responsible;
This man is responsible;
Some men are responsible;
Every tribe of mankind is responsible;
It is not true that some men are not responsible, etc., etc.

In Comprehension.

Man exists;
Responsibility is a real attribute;
Responsibility is an attribute of every man;
Responsibility is an attribute of this man;
Responsibility is an attribute of every tribe of men;
Responsibility is an attribute of some men;
Irresponsibility may be denied of all men;
No man is irresponsible;
Irresponsible beings are not men;
Men of wealth are responsible with their wealth;
To punish men is to punish responsible men.

See "The Laws of Discursive Thought: being a Text-book of Formal Logic," by James McCosh, LL.D.

corresponding dictum for negative reasoning. But the word "agree" is vague, and it is necessary to state the nature of the agreement. This is done by two formulæ, which act as the criteria of reasoning.

The Dictum of Aristotle.—We have before us a crocodile, and wish to know how it brings forth its young. Our two terms are "crocodiles" and "bringing forth their young." We find that it has been ascertained by science that the crocodile is a reptile, and that reptiles bring forth their young by eggs. We are now prepared to reason: "The crocodile, being a reptile, must bring forth its young by eggs." Here we have three terms: two called the extremes, the original ones which we wish to compare, "crocodiles" and "bringing forth their young by eggs," and a middle "reptile," by which we compare them. The process when expanded takes the form of two propositions, called the premises, and the conclusion drawn from them.

All reptiles bring forth their young by eggs;
The crocodile is a reptile;
Therefore it brings forth its young by eggs.

The conclusion is reached by the bare contemplation of the premises. The premises being true, the conclusion is true.

But this reasoning proceeds on a principle which it is desirable to have expressed and announced when it becomes the test of this kind of reasoning. It is, "Whatever is true of a class is true of all the members of the class." What is true of reptiles generally is true of the reptiles called crocodiles, and of every individual crocodile. If we have not something that can be predicated—that is, affirmed or denied—of a class to constitute a premise, no conclusion can be drawn. Thus, if only some reptiles are oviparous, if only the greater number are so, we are not entitled to conclude that the crocodiles must be so. We have thus a very decisive and easily applicable test of reasoning.

In formal logic this governing principle is spread out in various forms, so as to enable us to apply the test to every case of ratiocination. First, the syllogism is found to be the universal form of mediate reasoning. Then logicians divide reasoning according to the position of the middle term, which is the nexus of the argument, and this gives four figures. I do not mean to unfold these; they are to be found in every treatise on elementary logic. All that I have to do is to show that thereby we have a criterion of ratiocination.

All this was established by Aristotle in his "Prior Analytics." A number of attempts have been made since his day to set aside his analysis or to improve upon it. None of these have met with anything more than a temporary success. But I am not convinced that the dictum of Aristotle is the regulating principle of all reasoning; it regulates only that reasoning which involves a general notion—that is, a class notion. It can be shown, I think, that there is a ratiocination which does not proceed on the principle of classes, but of identity or equivalence. Thus, we find that the stick A is equal to the stick B, and the stick B is equal to the stick C, and we conclude that the stick A is equal to the stick C. Here we have no classes or members of a class. The canon is, "Notions which are equivalent to one and the same third notion are equivalent to one another." In ratiocination of this description the subject of the propositions may be made the predicate, and the predicate the subject:

> Shakespeare wrote "Hamlet;"
> The writer of "Hamlet" is the greatest English poet;
> Shakespeare was the greatest English poet.

All reasoning, in order to be valid, must fall under one or other of these rules, which are therefore the criteria of legitimate inference. When a professed argument cannot

be brought under either of them, it is a proof that it is not reasoning. When, on endeavoring to bring it under them, we find that it is not in accordance with them, we may conclude that the inference is not valid.

Reasoning may take several forms, which are legitimate provided they are in conformity with the dictum of Aristotle or the principle of equivalents. The natural form in ordinary circumstances is the categorical, in which we lay down a general principle and bring a particular under it; as when we say, "Consumption is a fatal disease, and as this man has consumption he has a fatal disease;" or, not being sure of the fact, we say, "If this man has consumption he has a fatal disease." This reasoning is hypothetical, and is quite as valid as the categorical. Or the reasoning may take the disjunctive form: "This disease is either a severe cold or consumption. It is not a severe cold; therefore it is consumption."

The greater portion of the reasoning in mathematics is regulated not by the dictum of Aristotle relating to classes, but the dictum of equivalence or equipollence.

SECTION III.

THE JOINT DOGMATIC AND DEDUCTIVE METHOD.

Here we begin with assuming something because it is self-evident, needing no farther proof; and then proceed to infer other truths involved. The best example is found in geometry, where there are laid down at the opening definitions of such things as triangles, circles, squares, and also axioms, or self-evident truths; and from these, and as involved in them, we get farther truths by deductive reasoning. We have also examples in Formal Logic, as

when the dictum of Aristotle is assumed, that whatever is true of a class is true of the members of the class, and from this get the modes and figures of reasoning, and innumerable inferences. The truths thus drawn are called apodictic by Aristotle and demonstrative by the moderns. In all such cases we have the tests of the assumed truths in self-evidence, necessity, and universality, and of the reasoned truth in the syllogism.

This method is powerful when we have the means of using it—that is, self-evident truths. But the field in which we have these is a very contracted one. In all investigations which deal with scattered facts the method is not available. "A clever man," says Sir John Herschel ("Nat. Phil.," § 67), "shut up alone and allowed unlimited time, might reason out for himself all the truths of mathematics by proceeding from those simple notions of space and number of which he cannot divest himself without ceasing to think. But he could never tell, by any effort of reasoning, what would become of a lump of sugar if immersed in water, or what impression would be left on his eye by mixing the colors of yellow and blue."

The method has often been applied illegitimately—that is, to departments which have to deal with scattered facts. In the sixteenth century, when mathematics were making such progress, there were attempts to carry the geometrical method into all branches of science. It was used by Descartes and his extensively ramified school in philosophy and also theology. Assuming the existence of thought, of *cogito*, as a truth which cannot be doubted, he thence proves his own existence, which it would have been wiser in him to assume, and then from the idea of the infinite and the perfect in himself, he argued there must be a perfect being existing whose veracity guarantees our idea of matter. Spinoza, in his Ethics, begins with a formidable

array of definitions, axioms, and postulates, whence he draws out a system in which God is at once extension and thought, and being the All is the morally evil in the world as well as the good. Samuel Clarke, finding that man could not get rid of the idea of space and time, argued that since all things must either be substances or modes, and as space and time are not substances, they must be modes of a substance, which is God, which by other considerations he clothed with benevolence. In these connected systems doubtful definitions were carried out, often by right reasoning, to very doubtful results. In all cases in which we have to use facts, and in which we seek to rise to facts, such as the existence and character of God, there is another method, that of induction, with it, it may be, deduction, which we may and ought to employ.

PART SECOND.

CRITERIA OF INDIVIDUAL FACTS AND THEIR LAWS.

SECTION IV.

INDIVIDUAL FACTS.

An eminent man is reported as saying that there are more false facts than false theories. There is truth in this. Facts are apt to have adjuncts to them in the reports given by others, and even in our own apprehensions of them, or they are so mutilated that they take an entirely distorted form. We all know how in story-telling additions and subtractions are apt to be made even by honest narrators, so as to make it more attractive and picturesque.

The individual facts are primarily made known by the senses. In these there may be very numerous and complicated details, and any of these if left out may so far distort our apprehensions and the account we give of them. Besides, sensations, feelings, fancies, inferences, attachments, and repugnances may mingle with our pure perception of sense and cast a glow or a gloom around them. In these sections I am showing that we have to guard against these temptations, and that when we do so we can arrive at positive truth.

Observation Proper and Experiment.—These are the two ways in which we obtain facts. In the former we

view objects simply as they present themselves; in the latter we put them in new positions. The advantage of Experiment over Observation Proper (which may be so designated as Experiment, is, after all, a kind of Observation) is that it enables us to perceive the proper action of the several agencies joined in nature. We wish to know whether bodies, whatever be their weight, fall to the ground in equal times. Common observation seems to show that they do not, as we see the gold nugget and the leaf falling at very different times. But we put the gold and the leaf into the exhausted receiver of an air-pump, and find them fall the same instant. What we should do in all observation is to note precisely what has occurred, and to report it accurately without any additions, subtractions, or coloring; we must be especially on our guard against torturing the facts in order to make them give a certain kind of testimony.

The Senses.—The older Greek philosophers adopted the common opinion that the senses deceive. The sceptics took advantage of the doctrine and argued that if the senses deceive there is nothing we can trust in. The sounder philosophers met them by calling in reason, which corrected the illusions of the senses and conducted to truth. Aristotle corrected both these forms of error, and showed that the supposed deception arises not from the senses themselves, but from the use that is made of their intimations.

To save the senses it is necessary to draw certain distinctions. In particular, we should distinguish between our original and derived perceptions. The former are intuitive, without any process of inference, having the sanction of the author of our constitution, and never deceiving us. The latter imply inferences from the revelations of sense perception, and there may be errors in them.

I believe we can approximately determine what are the

original perceptions of the various senses. By several of the senses we seem to perceive merely the bodily organs as affected. This is the case with taste and with smell, in which we discern simply the palate and the nostrils with a certain sensitive expression of the palate and the nostrils. It is the same also, I believe, with hearing and with touch proper or feeling, in which we know simply an affection of the ear and the periphery of the body. I rather think that by the muscular senses and the eye we discern more; a body resisting our organism and a colored surface affecting us. In all these intuitive perceptions there is no ratiocination, and there are and can be no mistakes. But in all beyond there are inferences, and in these there may be less or more of error. A person tells us that he had mutton to dinner, whereas all he knew was that there was a certain taste in his mouth which he argued was that of mutton. He further lets us know that he felt the smell of roses in a certain garden, where he also heard a flute playing, whereas immediately he felt only an odor in his nostrils and a sound in his ear. He is sure that he was struck in the dark with a man's hand, whereas the blow was from a stick. He depones that he saw a man strike his wife, while all he saw was an action of one figure upon another, and it turns out that the woman was not the man's wife. Hence arise some of the mistakes in witness-bearing; they are not lies of the senses, but errors in the inferences we draw from them.

In all such cases we form a general rule out of certain experiences, and in hasty thinking we illegitimately apply it. We regard sound as coming to our ear in a straight line from the sounding body, but the undulations have been reflected from a wall, and we place the bell from which they have come in that wall, whereas the belfry is actually in a different direction. It is on this principle

that the ventriloquist proceeds when he makes a human voice come from a post or an animal. Having laid down the rule that when there are few observable things between us and an object, it must be near, we look on that island seen across the sea as much closer to us than it is.

Some other distinctions must be attended to. Sensations and feelings, of pleasure and pain, of beauty and ugliness, associate themselves with all our perceptions, and are apt to give a color and even a shape to the actual things. We remember more particulars about the objects that excite us, whether joyously or grievously, than those that are dull and commonplace, and we give these a large, often an undue place in our narrative, and thus distort them and give them a different meaning.

The rapid inferences from the intimations of the senses may at times serve a good purpose. They may prepare us to meet and avoid danger when cool and correct argument would not be quick enough. A fire-bell, the jolt of a carriage in which we are riding, a stumble in walking, the fog-whistle at sea, may at times raise up an unnecessary alarm, but the calm reflection which succeeds will soon dissipate this, and at other times they save us from danger.

We have abundant means of correcting the hasty judgments. We have other senses at hand to correct the apparent deceptions of one sense. We imagine the figures raised optically by magicians to be real, but we can dissipate the illusion by thrusting our hand into the spectre. We may mistake beef for mutton as we eat it, but it is easy to apply to the person who prepared the food to set us right. A diseased eye may present objects double, but the touch will correct the mistake. In all cases we can secure that what is told us by the senses is true by judiciously using the means of correction at our disposal.

Self-Consciousness.—Metaphysicians commonly main-

tain that the revelations of consciousness are always to be trusted; that they settle everything in the last resort, and are, in fact, ultimate and infallible. But there are physiologists, and of a late date even metaphysicians, who assert that the acts of consciousness are variable and often deceitful. They show us that people often misapprehend what their real feelings are, and give a wrong account of them. It is alleged that there are persons who say that they believe certain tenets while they do not, only imagining that they do. There are cases of persons with a "double consciousness," as it is called, remembering, in the one state, their experience of that state, but without any remembrance of it in the other.

But in all such cases we attribute to consciousness what it is not responsible for. In regard to the inner, as in regard to external sense, we have to draw distinctions if we would determine its precise testimony. It is acknowledged by all psychologists that, properly speaking, we are conscious of self only in its present state. In that state there are various affections: there are sensations and feelings and inferences along with the pure consciousness, and we are apt to mix them up with each other, and thereby breed confusion in our apprehensions and in the account we give of what is in our mind. When we review our consciousness we are dependent on our memory, and we may omit some aspects of our experience and add associated affections. Here, as in regard to the bodily senses, distance is apt to lend enchantment to the view. The hypochondriac magnifies his sorrows, and the gay youth his pleasures in the past. People are apt to think their youth was happier than it really was; they remember their joys and forget the little disappointments which were then felt to be so great and now appear so little.

What is so called is not really "double consciousness."

It arises from a diseased state of the brain hindering psychical action. The person is unable to recall what has been laid up in the past, and he lives in the present and lays up a new experience, which he uses in his new state, but which he may lose in a later condition of his brain. The man is not under a double consciousness, but in two states, in each of which the consciousness may be correct.

It thus appears that man may trust in what his consciousness really reveals. It makes known to us self in its present state. It should be noticed that it does not know merely a quality of self, such as thinking or feeling; it knows self as thinking or feeling. This is of the nature of a first truth or an intuition; we perceive the very thing. This self constitutes what we call personality—that is, we know ourselves as persons. On comparing the self as presently known with the past self as then known, we declare ourselves to be the same. This is personal identity, which is a self-evident, necessary, and universal truth.

Memory.—The vulgar opinion is that the memory may deceive. But it does so only as the senses deceive. The mistakes are not in the memory proper, but in the associated affections and the inferences drawn from them. We ask a man how long it is since he visited us. His recollection is dim, and he makes the time longer than it is, six years instead of five. It is not possible for him to remember his continued existence during these years, any more than it is possible for the eye to see every point in space between us and objects five or six miles off. In both cases he has to avail himself of intervening objects. The event, he remembers, took place after his marriage, seven years ago, for his wife was with him; and before his mother's death, four years ago, for he remembers we made inquiries about her health. But he does not recollect at what precise date between these two occurrences the visit

was paid. The reminiscence is dim and he concludes that the event is more distant than it really is. Our memories in regard to time all need such mile-stones, or rather time-marks, to enable us to measure the distances. Now, in all these processes there may be mistakes. It is much the same with our recollections of the other circumstances connected with events, such as the shape and color of objects, their position in relation to other things, their surroundings, their antecedents and consequents. The vision is obscure and we have to fill it up, and we do so by fancies of our own, which so far modify the scene, perhaps pervert it. We are apt to join causes and consequences with the bare occurrences. This is especially apt to be the case with conversations, with the sentences uttered by ourselves or by others. We recollect how we felt, what we meant to say, what effect was produced on us by what others said, and we confound these with what was actually uttered. Hence the misunderstandings, the perversions which are so apt to appear in the reports of conversations. In the complicated scenes through which we have to pass we remember those parts that have been most vivid—these, I suppose, have impressed themselves most deeply on our organism, and the others are feebler. The consequence is that the record has faded in some places, and we make additions in order to complete it. In this way we clothe our bare memories with dresses, which may make them look sadder or more joyful than the events really were at the time.

But it is always possible to distinguish between our original and proper recollection and our superadded and fictitious ones. Those who are conscientious will be careful not to add out of their own stores to their memories. When the reminiscence is dim they will at once confess it, especially in witness-bearing, and when the character of a fellow-man may be affected. In all scenes which we wish

to remember accurately, we will take pains to note the exact incidents at the time they occurred. There are events of which we may be, and are certain, that they have happened.

Testimony.—It is not necessary to suppose, with some of the Scottish metaphysicians, in their answers to Hume's argument against miracles, that there is an original instinct or principle of common sense leading us to trust in testimony. I believe, indeed, that there is a social affection in all of us inclining us to have an affection for, and trust in, those we meet with, especially in father and mother, brothers and sisters, and leading us to believe in what they say. But the belief in testimony is the result of experience, and is modified by experience; we trust in certain testimonies, but not in others. There is a conscience in every man which disposes him, if he does not resist it, to speak truly; even selfishness prompts him not to lose the confidence of his fellow-men by deceiving them. Hence, the great body of mankind speak the truth when they are not led to act otherwise by a desire to excuse themselves, or by malignity toward their neighbor, or some other like motive. We can reach truth by means of testimony. It was in his haste that David said "All men are liars."

The testimony of one man is often sufficient, because of his character known otherwise; and because he has no motive to deceive. We lay down rules for our guidance in judging of testimony, as that it is a good sign if the statements are direct and unartificial. In most cases we seek to have the testimony of one man confirmed by another, that in the mouth of two or three witnesses every word may be established, it being shown that there has been no collusion or conspiracy. There are commonly circumstances which corroborate or detract from the testi-

mony. Circumstantial evidence is at times sufficient to prove that a prisoner has been guilty, when there is no direct evidence of the act. In witness-bearing, books of law and judges on the bench lay down rules which may guide the jury in the verdict which they bring in.

History.—Here the evidence is mainly that of written testimony, which, however, may be confirmed by original historical documents, such as monuments, inscriptions, coins, and ancient charters. Laplace, misled by a false analogy derived from the diminution of light when reflected successively from a number of surfaces, declares that the value of testimony may be weakened by transmission, and at length altogether lost (*Essay on Prob.*). This is true of tradition, that is, of oral testimony transmitted from mouth to mouth, or from age to age; but Sir G. C. Lewis (*Meth. Obs. and Reas.*) has shown that, "when the testimony of the original witness has once been obtained and recorded, either by himself or others, in an authentic form, it is perpetuated so long as the written memorial of it is preserved in the original, or in a faithful transcript, and may at any time be used for historical purposes."

SECTION V.

INDUCTION.

This consists essentially in gathering facts in order to ascertain the order that they follow, which will be found to consist in laws which they obey. It was known to Aristotle that the mind starts with the singular (*τὸ ἑκάστον*) before it rises to the universal (*τὸ καθόλου*), which, as he expresses it, may be first in the order of nature, while the singulars are first in the order of time. He practised the method in his natural history, very specially by the collec-

tions which were supplied by his pupil, Alexander the Great. But he cannot be said to have systematically expounded induction as a method of discovering truth. This was reserved for Francis Bacon, who enjoined that in observational science, the mind should begin with particulars, which are to be collected and collated, and then rise to minor, middle, and major axioms, and thence finally to causes and forms. All this was to be done not *per saltum*, but by gradual steps. The method has since been made more definite by Sir John Herschel, in his "Natural Philosophy;" by Dr. Whewell, in his various works on "The Philosophy of the Inductive Sciences;" by John S. Mill, in his "Logic," and by others. The method will become more perfected as science advances with its observations and experiments, with its instruments and its critical examinations. That method has a Means and an End. The Means are observation with analysis. The End is the discovery of laws.

Analysis and Synthesis.—By the former we separate a concrete or complex object into its parts. In chemistry there is an actual separation of one element from another, say the oxygen from the hydrogen with which it is combined in water. But in most investigations, the separation is in thought. Thus in all bodies we find both extension and energy, which cannot be separated in fact. Thus logicians analyze discursive thought into simple apprehension, judgment, and reasoning, or in the expression of these into the term, the proposition and argument. The process is performed by abstraction, in which we contemplate in thought a part of a whole presenting itself, more particularly an attribute of an object, say gravitation. In analysis we separate the whole into its several parts. Abstraction can be performed on every object, as every object has more than one quality, and we can fix on any one of these. Analysis

can be performed only when we have such an acquaintance with an object as to know all its parts.

The exercise of abstraction, and when it is available of analysis, is required in every kind of investigation. Bacon speaks of induction, commencing with "the necessary rejections and exclusions," that is, the separating of the matter to be investigated from the extraneous objects with which it may be associated in nature. Whately says ("Logic") that in teaching a science, the analytical mode is the more interesting, easy, and natural kind of introduction, as being the form in which the first invention or discovery of any kind of system must originally have taken place. Whewell gives an apt name to the procedure, which he recommends as the "Decomposition of Facts." It serves not only to separate objects from others, but to break them down, so that we may obtain a better acquaintance with them, with their internal structure and their several qualities. It is a process to be employed throughout in all investigations of nature, which in every department is full of complexities.

Analysis can scarcely be described as discovering truth. It is rather a means or instrument toward this end. At the same time, it should be noticed that when we abstract a part, say a quality, from an object, the part, the quality, has a reality as well as the whole. If the concrete be real, the abstract is also real. The abstract may not have an independent reality; thus gravitation has no reality except in body, but it has a reality in body. The criterion here is that the part be really a part of the actual whole, that the quality be a real attribute of a real thing.

Analysis is a sharp and may become a dangerous instrument. It may be over subtle and dissect and kill what should be kept alive and entire. It is fulfilling its end only when, to use an illustration of Plato's, it is dividing the

carcass as the butcher does, according to the joints. Among the ancient Greek philosophers the analytic was the method commonly employed. Down to this last age the analytic and the synthetic were represented as methods of discovering truth, and had large fields allotted to them. Kant's great work, the "Critick of Pure Reason," is divided into the analytic and synthetic parts.

In synthesis the parts are put together to show that they make up the whole. Thus Whately decomposes discursive thought into the term proposition and argument, and then shows synthetically that these make up the whole process. Sir John Herschel, in his "Astronomy," begins with taking up the several departments of the heavens, and then expounds the whole science. The two, analysis and synthesis, must continue to be used as instruments, but they now do so in the methods of induction and deduction.

Criteria of Laws.—Hitherto we have had to do with individual facts, which tell us nothing beyond themselves. We have not as yet any means of anticipating the future from the past, or gathering wisdom from experience. In particular, we have no science, which consists, not of scattered and isolated facts, but of systematized knowledge. In the construction of science we must co-ordinate the facts. In doing so we discover the laws and find that all mundane affairs are regulated by laws.

But the question arises, How do we from individual facts reach a law? Or, more specifically for our present purpose, When are we entitled to conclude and be satisfied that we have found a law which may be regarded as general or universal? The answer of those who have not thought specially on the subject would be, When we have observed all the facts. But a moment's reflection shows that in most cases, I believe in all, we cannot find out all the facts. We assert that crows are black, but we cannot

go the round of the world and ascertain that it is so. We may have examined millions of cases and found all crows black, but how do we know that a traveller may not report that he has found a white crow in some distant island? In science we say that all mammals are warm-blooded, or that all matter attracts other matter inversely according to the square of the distance; but no one has searched the universe and noticed every mammal and every particle of matter so as to be able to say that no mammal is cold-blooded, and no particle of matter without the power of attraction. But from a limited number of observations we can rise to a law which seems to be universal. How is it so? Mr. Mill maintains that he who can answer this question is wiser than the ancients.

Bacon describes the method of observation by "perfect innumeration" of cases as puerile and incapable of yielding any fruitful results. In induction we have to rise from the unknown to the known. We argue from a limited number of cases in the past to a universal law which we hold to be true in the future, not only so, but in all unknown cases, past and present. The father of inductive philosophy was aware of the difficulty of the problem, and he sought to solve it by bringing in Prerogative Instances (*Prerogativæ Instantiarum*) which could determine what is true of all instances. To give only one example, that of *Instantia Crucis*, the metaphor being taken from the notice put up where two roads meet to tell which to take. It was disputed whether light consists of material particles or of vibrations in an ether. To settle this it was maintained by Fresnel that instances can be artificially produced which are inconsistent with the material, but not with the undulatory theory. But we have now better tests in the Canons of Induction.

In all such investigations we must take along with us

two grand principles. One of these is the principle of Cause and Effect. I believe this to be an intuitive principle, standing the tests above enunciated. I believe that when we discover anything beginning to be, we look for an antecedent producing it—a substance with power. But without entering at this place on this disputed metaphysical subject, I may take it for granted that the principle of causation is sanctioned by a universal experience, and will not be denied by any one. Many, indeed, feel that the principle may require to be enunciated anew and put in a better form since the discovery of the law of the Conservation of Energy, or the Persistence of Force, as Herbert Spencer calls it. But whatever be the best shape in which to put it, we assume in all induction that causes produce their proper effect, and that every new product or change in an old thing has a cause. One of the aims of inductive science is to discover what has caused a given phenomenon, what has produced it in the past and will produce it again. But we have need to assume more than this.

The second is the principle of the Uniformity of Nature, as it is loosely called. The principle of causation might have reigned in all nature and yet there have been no uniformity. All action in nature might have as its sole cause the fiat of God. The connection of all things would, in this case, be with God, but not with one another. The spring, with its buds and blossoms, would be produced by God, but this would give no security that the fruits of autumn were to follow. Or, again, there might be constant interferences by God with the operation of natural agents; or causal agents might work, and yet there be no such thing as the general laws, such as the seasons, which we observe and trust in. We find, instead, that the agents of nature are so disposed or arranged that they produce uniformities, not the result of any one cause, but of a com-

bination and harmony of causes, such as the periodicity of the heavenly bodies, the flow of the tides, the regular return of the seasons, the plant rising from a seed and producing a seed, the descent of the animal from a parent, its growth and its death. All these imply causation, but they require more—an adjusted causation.

But it is necessary to settle more definitely what is implied in the uniformity of nature which lies at the basis of all induction. It implies first that there is a certain number of agents acting in nature—it is not necessary for us to settle how many. Secondly, that these are so collocated or arranged—I believe, adjusted—as to produce general results called laws, which we observe and act upon and can scientifically express. Thirdly, these agents constitute nature, and there is no introduction of new agents and no interference with them in ordinary circumstances. This statement does not preclude miracles on rare occasions, these miracles not being contrary to the law of causation, for they have the power of God as a cause, but they are simply an exception to the uniformities of nature.

We thus see that there are two kinds of laws sought after in induction. The one, the primary and the fundamental, are the laws of causation. In the inquiry into these, we seek to settle the precise nature of the causes acting—what is the precise nature of the power which keeps the moon in her sphere and makes the apple fall to the ground. Or, having discovered the cause and its nature, we try to find what will be its influence and effect in certain circumstances—how, for instance, gravity will produce tides in the ocean.

Canons of Induction.—There seem to be three grand ends which men of science have in view in their investigations. One is to discover the composition of the objects around us; the second is to discover natural classes; the

third is to discover causes. There are canons which guide and guard us in each of these investigations.

I. *Canons of Decomposition.*—Almost all the objects we meet with in the world, whether material or mental, are composite. It is the aim of many departments of science, in particular of chemistry and psychology, to analyze them. This can, so far, be effectively done. There are certain rules to guide us, and these may be made more and more specific as the analytic sciences advance.

A. We must separate the object we wish to decompose from all other objects. If we wish to analyze water, we must have pure water separate from all other ingredients. If we wish to analyze intuition or reasoning, we must separate it from all associated observations and fancies.

B. When we have found the composition of any piece or portion of a substance, we have determined the composition of every other part, and, indeed, of the whole. When we have ascertained that a pint of water is formed of hydrogen and oxygen, we have settled that water everywhere is composed of the same elements. This arises from the circumstance that every substance in nature has its properties which it retains. Having detected these properties in one case, we have found what they are in all.

C. The elements reached are to be regarded as being so only provisionally. We are not sure that in any cases we have found the ultimate elements of bodies. At present it is supposed that there are sixty-four elements, but we are not sure of any one of these that it will never be resolved into simpler substances. Meanwhile the chemical analysis is correct so far as it goes. It will always hold true that water is composed of oxygen and hydrogen, though it is possible that oxygen or hydrogen, one or both, may be resolved into something simpler.

Canons of Natural Classes.—There are certain sciences

which are called by Whewell classificatory. They are such as botany, zoology, and mineralogy. We may have two ends in view in classifying; one may be simply to aid the memory by having the innumerable objects of nature put into a convenient number of groups. For this purpose we fix on certain obvious and convenient characteristics and put all the objects possessing them into one class. It was thus that Linnæus put under one head all plants possessing the same number of stamens and pistils. This arrangement, though it does not come up to the requisitions of a perfect classification, is found to be very convenient. Second, our object may be to increase our knowledge by so arranging objects that one characteristic may be a sign of others. In natural classification we should always aim at securing both these ends. There are canons which may assist us in determining when we have reached natural classes.

A. We must have observed the resemblance in many and varied cases, say in different countries and at different times.

B. We must be in a position to say that if there had been exceptions, we must have met them. These two rules guard against forming a law from a limited class of facts.

C. There are classes in nature called Kinds, in which the possession of one quality is a mark of a number of others. All classes entitled to be called natural are more or less of this description. Thus, mammals are so designated because they suckle their young; but this characteristic is a mark of a number of others—that the animals are warm-blooded, and have four compartments in their hearts. Reptiles are recognized as producing their young by eggs, but they are also marked as having three compartments in the heart, and being cold-blooded.

These canons guarantee truth. When we are able to place objects in a class, we know that they possess the properties of the class.

Canons of Causes.—The most lucid and, upon the whole, the clearest and most satisfactory exposition of these methods is by Mr. John S. Mill in his "Logic." It should be noticed that his methods relate to causes, and we have not had from him an exposition of the canons of decomposition and classes as given above. He mentions four or five methods.

A. The Method of Agreement.—In the spring season we see innumerable buds, leaves, and blossoms appearing upon the plants, and we find the common cause to be the heat of the sun shining more directly upon the earth. The canon is, "If two or more effects have only one antecedent in common, that antecedent is the cause, or, at least, part of the cause." That canon is too loose to admit of a universal application, as we may not be sure that the point of agreement we have fixed on is the only one.

B. The Method of Difference.—In the very middle of the day I find the scene around me on the earth suddenly darkened. There must be a cause. I find that the moon has come between us and the sun, and this seems the only difference between the two states—the one in which everything was bright, and the other in which it is in gloom. The canon is, "If in comparing one case in which the effect takes place and another in which it does not take place, we find the latter to have every antecedent in common with the former except one, that one circumstance is the cause of the former, or, at least, part of the cause." This method is the one employed in cases in which experiment, with its separating power, is available. It is the most decisive of all tests when the circumstances admit of its application. There are cases in which this

method is not applicable, when a sort of intermediate one may come to our aid.

C. The Indirect Method of Difference, or the Joint Method of Agreement and Difference.—The canon is, "If two or more cases in which the phenomenon occurs have only one antecedent in common, while two or more instances in which it does not occur have nothing in common but the absence of that antecedent, the circumstance in which alone the two sets of cases differ is the cause, or part of the cause, of the phenomenon." The illustration given by Mr. Mill is: "All animals which have a well-developed respiratory system, and therefore aërate the blood, perfectly agree in being warm-blooded, while those whose respiratory system is imperfect do not maintain a temperature much exceeding that of the surrounding medium; we may argue from the two-fold experience that the change which takes place in the blood by respiration is the cause of animal heat."

D. The Method of Concomitant Variations.—We want to know the cause of the rise of water in a pump or of mercury in a barometer. The ancients accounted for this by nature's horror of a vacuum, which is inconsistent with the fact that water will not rise above a certain number of feet in the pump. Torricelli and Pascal gave a better explanation when they referred the rising of the water or mercury to the weight of the incumbent atmosphere, which Pascal proved by ascending a mountain with a barometer, and finding that, as he rose higher and higher, the mercury fell lower and lower in the tube. Here we have the effect varying with its alleged cause, which is an evidence that the alleged cause is the true one. The canon is, "Whenever an effect varies according as its alleged cause varies, that alleged cause may be regarded as the true cause, or, at least, as proceeding from the true cause."

E. The Method of Residues.—A farmer knows how much grain a particular field has yielded in the past. He mixes manure with the earth on the field, and finds he has a larger crop, and he ascribes the increase to the manure. He knows what the previously existing antecedents will produce, and after subtracting this, he ascribes the residue to the new antecedent. The canon is, "Subtract from an effect whatever is known to proceed from certain antecedents, and the residue must be the effect of the remaining antecedents."

I do not need here to give anything more than the above general account of these canons, which are fully unfolded by Mr. Mill. I mention them simply to show that when they are applied they settle for us what is truth.

Reasoning in Induction.—The question is started, Is there reasoning in induction? I am sure that there is. From what has been ascertained by observation taken in a wide sense we infer something else—that there is a law which enables us to predict results.

How is it that the countryman is enabled to predict a coming storm? His father has told him, or he himself has observed that when the wind is in the East, and the clouds are thick and black, there will probably be rain or wind. Here there is evidently inference which can be stated syllogistically by the logician, the general observation being the major premise, the particular state of the wind and sky the minor, and the conclusion that there will be a storm. Every class of men, in fact all men, do thus reason on premises implied, though possibly not expressed. The laborer argues, in his own way, that there should be a rise of wages; the merchant purchases because he concludes there will be a demand for his goods. Before there were any precise rules laid down on the subject, scientific men drew true and important conclusions from common-sense principles in their own mind. The canons of in-

duction now expressed definitely enable us to put the reasoning in a more systematic form, which is a great advantage. We can now use the canons of induction (which, I believe, will become more definite and better expressed) as our majors in the syllogism of induction.

Major. When two or more effects have only one antecedent in common, that antecedent is the cause.

Minor. But the budding of innumerable plants in spring has only one common antecedent—the return of the sun to a higher altitude.

Conclusion, this one antecedent *is* the cause.

This is the method of agreement. Let us take a case from method of concomitant variations.

Major. Where an effect varies with its supposed cause, this is the true cause.

Minor. But the rising and falling of the mercury in the barometer varies with the less or greater weight of the superincumbent atmosphere.

Conclusion, the weight of the atmosphere is therefore the cause of the rise or fall of the barometer.

It should be observed that the canons, with their implied reasoning, do not guarantee to us absolute certainty, what is called apodictive truth or demonstration. None of these are certified, as first truths are, by the law of necessity; we can easily conceive any one of the ordinary physical laws not to be true universally, and we might believe so provided we have evidence. The evidence, after all, is merely a probability of a lower or higher degree, but may rise to a certainty only a little short of being absolute, and quite sufficient to justify us to put trust in it and act upon it in ordinary, indeed in all, circumstances. Such, for instance, is the proof which we have in favor of the law of gravitation. It is not demonstrative like a mathematical truth, but it satisfies the mind and is verified by constant observation.

SECTION VI.

THE JOINT INDUCTIVE AND DEDUCTIVE METHOD.

J. S. Mill argues that more progress will now be made even in observational sciences by deduction than by induction. This may be doubted. It seems to me that observation and experiment must always be the surest way of advancing research. But deduction may be joined to induction. When this is done the method may be called the Joint Inductive and Deductive. This is, in fact, the method represented by Mr. Mill as conducting to such fruitful results.

In this method the inquirer begins in the inductive method, that is, he observes facts with care and with the view of discovering a law. As he proceeds he will ever be asking whether the law is so and so, that is, devising an hypothesis. In order to determine whether this is a true law of nature, he has to examine further facts, it may be, facts of a different kind. As he acts thus, he may find he can apply deduction. He inquires what effects follow from the law in his mind, and he then compares these with the facts. If he finds these to correspond, he has a Verification of his Hypothesis. It is by combining the two in this way that the greater number of the established laws of nature have been discovered. In some cases there have been long processes, both of induction and deduction, before the law has been ascertained and adjusted. When the laws of nature are quantitative, as they commonly are, mathematics may be applied to them, and it becomes the instrument of the deduction, and often a far-reaching one, showing very distant consequences which can be compared with facts.

In the sciences of observation sometimes the inductive

element and sometimes the deductive method is the more prominent; in all cases the inductive, as I reckon, is the essential. In Galileo's researches experiment was the main instrument, but he also used mathematics. Kepler's fertile mind was always devising hypotheses, but he accepted them only as they were confirmed by observations. It would be wrong to say that Newton's method was mere induction. He had before him the observations of Galileo and Kepler, and also a measurement of the distance of the earth's surface from the centre, and he applied a powerful mathematics, created by himself, to these facts. It is a circumstance greatly to his credit that when, on having a wrong measurement of the distance of the earth's circumference from its centre, he found his theory that the moon was held in her sphere by the same power as draws an apple to the ground not in accordance with facts, he gave it up for a time, and only resumed it when it was found, on the proper distance of the earth's distance being ascertained, that the facts corresponded. In all departments of physics or natural philosophy the deductive mingles with the inductive. In optics, in thermotics, in theoretical astronomy, in mechanics, the deductive or mathematical element has a conspicuous place; but in all these sciences we have always to start with observed facts. In ethics we carry out indefinitely the laws of our moral nature; but these have been ascertained by a previous observation of that nature. In like manner, in logic we deduce consequences from the laws of discursive thought, which we have found by observing how they act in the mind. In all the social sciences there is a mixture of the two elements, sometimes the one and sometimes the other being the more predominant. Jurisprudence is forever appealing to fundamental principles, and inquiring how they apply to a given case. The science of national wealth must be

constructed mainly by the observation and collection of facts, in statistical and other forms; but there are universally operating principles ever called in. Thus it is supposed that men are usually swayed by a desire to promote their interest so far as they know it. This is certainly a powerful motive. But there are others, such as the desire for fame, for power, for society, for the beautiful, for the promoting education and religion, all actuating individuals, and the influence may be traced in the progress of nations. In chemistry the laws have to be ascertained by observation, particularly by experiment; but when principles have been discovered, such as that of affinity, they may be carried out indefinitely. Psychology, as a science, is constructed mainly by the observations of consciousness; but having ascertained certain laws, such as those of the association of ideas, we can explain how they affect our beliefs and feelings. In pedagogics, or the science of teaching, we must carefully observe the ways of children; but, in doing so, we discover their actuating motives, such as the love of knowledge, the love of play, the love of approbation, which have to be taken into account in constructing our methods of instruction and discipline. In æsthetics there are ascertained laws of taste which must be taken along with us in the construction of the science. In all departments of natural history, observation must play the most important part; but there are laws of life and of form to guide biologists in all their investigations.

The principles from which we deduce conclusions are of two kinds. Some are self-evident or demonstrative. Such are moral laws and maxims. These are assumed, and are applied extensively and constantly in history and in all the social sciences, in all sciences which deal with motives and character. Of this description is the maxim that men are likely to be happy and comfortable when

they are moral. To this same class belong all mathematical propositions founded on axioms. These self-evident truths are seldom formally enunciated, they are simply assumed and applied. So far as science uses them, it is very much employing the joint Dogmatic and Deductive method. But there is a second kind of principles used in deduction even more extensively; these are acknowledged truths and wise saws established by a large induction. For example, any one may now assume the law of gravitation. In optics it is allowed that the angle of reflection is equal to the angle of incidents, and from this a great many particular truths may be drawn. In chemistry it is taken for granted that the elements combine in certain proportions, and from this a multitude of consequences follow.

In this joint method the induction is tested by the canons of induction and the deduction by the rules of reasoning.

Hypotheses and Verification. Consilience of Inductions.—"Hypotheses non fingo," said Newton, meaning, perhaps, that he introduced no fictitious agency, but merely *veræ causæ*, such as existed in nature; or, more probably, that he accepted no truth till it was established. Since Newton's time, especially within the last age, hypotheses have played a very important part in all departments in which the laws have not been settled, as, for example, in electricity and biology. The investigator is bent on knowing what laws certain phenomena follow. But in nature divers agents are mixed up with one another, and we cannot determine what they are by a loose inspection. As he observes tentatively, he makes a supposition suggested by the facts as to what the law should be. When he notices the descent of plants and animals, he says to himself, Let us suppose the law to be that of development or heredity. He has now a specific end to work for, and he observes

and collects facts, and inquires whether they agree with the hypothesis he has formed. If he finds that many of them do so, he has a probability, and is encouraged to proceed; and if the hypothesis explains a large body of events it rises to the rank of a theory. When it takes in all the facts bearing on the particular case, and no exceptions can be discovered, it is regarded as a law of nature, which, however, may require to be modified and adjusted before it suits all the facts, and so becomes the true law. This process is called

The Verification of Hypotheses.—When first suggested the supposition may have little to support it, and there may seem to be facts opposed to it. But if it is the correct one, there will come confirmations from a variety of quarters, difficulties will disappear, and the seeming exceptions may corroborate it. The hypothesis started is that light consists in vibrations, not a very probable supposition beforehand, but then it is found to explain one set of phenomena after another, till at last it seems to account for everything, and is counted as an established law. Or the hypothesis is that of the conservation of energy, or that the amount of energy in the world, real and potential, cannot be increased or diminished. On the first consideration of this view, obvious objections will present themselves. We strike with a hammer upon a piece of iron till our strength is exhausted, and it looks as if force had been expended and lost. But, on further inquiry, we detect the energy that had gone out of the body to be conserved in the molecular motion or heat of the metal.

Hypotheses, I rather think, must be resorted to in the early stages of the investigation of every sort of phenomena. They are simply tentatives, and most of them may have to be abandoned. They may or they may not be announced: they may, in the first instance, be simply

guesses, and only a few or one of them prosecuted to any great extent. The law of gravitation was for a time only an hypothesis, taking the erroneous form that matter attracts other matter, not according to the square of the distance, which is the true law, but according to the distance. Hypotheses are necessary, but are to be carefully watched and limited.

First.—The hypothesis must be suggested by the facts and not be feigned by the mind; this may be the meaning of Newton.

Second.—It must be regarded as a mere hypothesis till it is established by the criteria applicable to the department. We are much troubled in the present day by hypotheses being represented as established laws.

Third.—The hypothesis is to be abandoned when it is found that there are facts inconsistent with it. It requires much courage to abandon an hypothesis which has long been cherished and perhaps published to the world.

Fourth.—It is established as a law when it explains all the phenomena bearing on the subject and is not contradicted by any known fact.

It is a powerful confirmation of an hypothesis when it enables us to predict occurrences. If the alleged law be the true one, the facts will correspond to it in the future as in the past, and as they fall out will tend to prove that the hypothesis is a sound one. Dr. Whewell has shown that the evidence in favor of our induction is of a much higher and more forcible character when it enables us to explain and determine cases of a kind different from those which were contemplated in the formation of our hypothesis. "Thus it was found by Newton that the doctrine of the attraction of the sun, varying according to the inverse square of the distance, which explained Kepler's third law of the proportionality of the cubes of the distances to the

squares of the periodic times of the planets, explained, also, his first and second laws of the elliptical motion of each planet, although no connection of these laws had been visible before. Again, it appeared that the force of universal gravitation, which had been inferred from the perturbations of the moon and planets, by the sun, and by each other, also accounted for the fact, apparently altogether dissimilar and remote, of the precession of the equinoxes." He designates this process as the Consilience of Inductions. He declares: "No example can be pointed out in the whole history of science, so far as I am aware, in which this consilience of inductions has given testimony in favor of an hypothesis afterward discovered to be false."

SECTION VII.

CHANCE.

In one sense there is and can be no such thing as chance, that is, an event without a cause or without a purpose. Every occurrence has a cause in God. Not only so, but in the ordinary affairs of this world it has a mundane cause. Further, it falls out according to the uniformity of nature.

But there are senses in which there is a chance in our world. The oldest definition of chance (τύχη) was by Anaxagoras, who makes it an event whose cause cannot be discerned by human reason (λογισμῷ). This account needs only to be a little expanded and made more definite. There are occurrences of which the cause or the law is unknown, and, in consequence, we cannot anticipate their occurrence. This may arise from the cause being utterly unknown to us. More frequently it arises from the com-

plexity of nature, from there being a number of agents working, or from the nature of their operation. We may know all the agencies at work, but we cannot tell how they are working. In all cases the events do not recur with such regularity as to constitute a law. There was a time when eclipses were regarded as coming according to no law, and men, following the law of causality, referred them to a deity. When these causes were discovered they were found to have periods, and astronomers could predict their recurrence, and they were viewed in a different light. Till lately meteors were supposed to appear capriciously, but now showers of them are expected at certain seasons of the year, and nobody ascribes them to chance. When we shake a die in a dice-box, we are acquainted with the mechanical law which it obeys in its movements, but we cannot say which side will cast up. We know, in a general way, what physiological agencies produce death, but we cannot predict at what precise time any man will die.

Still, even in such cases a certain kind and amount of truth may be had, and this from the circumstance that the event proceeds, after all, from causes which operate regularly and from there being a limited number of causes. We find that, given a sufficient number of trials, each side of the die will come up the same number of times; if any side comes up more frequently than another, we argue that the dice have been loaded. We do not know when any one man will die, but we can ascertain what number of people will die in a given time in a community.

In such cases we can strike an average, and we can foretell average results and estimate the probability of a given event. When we speak of the probability of an occurrence, we are not to understand this as implying the uncertainty of the occurrence considered in itself. The event, say the death of a person on a certain day, may be abso-

lutely sure, owing to causes operating. We can conceive that there are higher intelligences to whom it would not be uncertain. We are sure that it would not be so to the view of the Omniscient. It is so to us because of the limited nature of our faculties and of our knowledge of the causes operating. Were we cognizant of all the antecedent circumstances we might in many cases be able to predict the result. It is because of our ignorance that the event is uncertain to us. The probability or improbability is not in the event which we have for expecting it; it is subjective and not objective.

In all cases we must have certain data gained by observation and yielding a general average. In some departments we can express numerically the probability or improbability of the particular occurrence. An event reckoned impossible may be represented by 0, an event certain to happen by 1. All degrees of probability may be denoted by the fractions representing value from zero to unity. The probability of an uncertain event is represented by the number of chances favorable and unfavorable. Thus the casting up of a head or a tail being 1, and the chances against it being 2, the proper chance is one-half. The tables that have been prepared for life insurance companies have been very elaborate, but need not here be given.

There is another sense in which it may be said that there is such a thing as chance. There cannot be an occurrence without a purpose on the part of God, who has ordered the causes producing it. But there may be a concurrence without a design. It is by chance that certain rocks take the form of the face of Napoleon or Wellington. I do not know that there was any purpose designed or effected by so many men of genius being born in the year 1759, or by Cervantes dying on the same day as Shakespeare

died. There are certain minds that take the keenest interest in observing such coincidences and discover a deep meaning in what is in itself meaningless; for example, connecting a calamity with the spilling of salt at a table, or from thirteen persons meeting at that table. On the other hand, when there is an immense congregation of agents that are independent, to produce an evident benevolent end, for instance, of vibrations of light of coats, and humors, of rods and cones, to enable us to see through the eye, there is evidence of design, the chances being all against such a concurrence.

SECTION VIII.

PSYCHOLOGY.

Here, as well as in all the physical sciences, we have to begin with the observation of facts. There is, however, an important difference between the two departments. The facts in physical science are obtained by the senses; whereas, in mental science, the observing agent is self-consciousness. It is only thus we can find out what any psychical act is. An examination of the nerves and brain may show how a mental state arises, but can give no idea of the mental act itself, say of a sensation, a recollection, an imagination, of moral approbation, of emotion or wish. But in making consciousness our witness we have to allot to it a large province. We must include in it not only immediate introspection, but also the observation of the mental acts of others, as disclosed in their words, their writings, and their deeds. We cannot, indeed, look directly into the bosoms of our fellow-men so as to ascertain what is passing within, but we can gather what this is by the

expression of it, which, be it observed, we can understand because we are conscious of our own acts. History, biography, travels, plays, novels, newspapers, and especially conversation and familiar letters, may all show us human nature quite as much as they do external incidents. Without these supplements we should have a very contracted view of the mind by inspection of our own souls.

The individual facts are made known in this way. The criterion of consciousness is in itself, it is self-evidencing. As we observe the facts we distinguish between those that differ and co-ordinate them into laws. The criteria of the laws are much the same as those of physical science.

Psychology proceeds on the same two fundamental principles as physics. It is seeking for causes. Without determining the question of the freedom of the will, we may confidently affirm that causation, that the persistence of force, rules in the mind as it does in the body. Certain antecedents are sure to be followed by certain consequences. The orator urges the considerations which may persuade those whom he is addressing and lead them to action. The poet raises up images that please and elevate the mind. The father and the teacher inculcate principles which may guide the young in all their future lives. Investigators in this department have been seeking to discover faculties and the rule and mode of their operation. The early Greeks found sensation, the discursive power, and reason. Aristotle had in the soul the nutritive power sensation, memory, phantasy, and above these, the reason, active and passive. In all ages there has been a grand distinction drawn, in a loose form, between the intellect and the will, the cognitive and the motive powers. Everybody talks of the memory, the judgment, of reasoning, and of sentiment and feeling, of the power of abstracting, generalizing, distinguishing, of loving and of hating.

There seem, also, to be laws of uniformity in nature. It does not appear that in the association of ideas one idea is the cause of that which succeeds; that when height suggests hollow, and the dwarf suggests the giant, and prosperity, adversity, and a portrait the original; that when we count up from one to one hundred, there is a causal connection between the ideas—they are the joint effect of a number of causes. In the science of psychology we seek to discover these laws, such as the law of habit, the connection between the idea and the feeling raised by it, the kind of acts which conscience approves of.

Now, there may be criteria of these laws, both of causation and uniformity. These have not been so carefully enunciated as those of physical science. I believe that, *mutatis mutandis*, they may be considered as very much the same.

The Method of Agreement.—Washington is named, and we find the mind following a certain train. We think of his education, his training, the revolution, his battles, his character, all of which have been previously in the mind together, and we reach the law of contiguity, that when ideas have been in the mind at the same time, when one comes up the others are apt to follow.

The Method of Difference.—We see a portrait of Washington for the first time. The two, the portrait and Washington, were never before in the mind together, yet the portrait calls up Washington, and the law is, things that are related, especially things that are like, recall each other.

The Joint Method of Agreement and Difference.—There are days in which we find that we can easily recall the things we would remember, other days in which they will not come up. The difference is in the time: that in the first few days our brain was in perfect health; in the

other we had a headache, and we discover that the state of the brain affects our associations.

Method of Concomitant Variations.—When we are interested in an event known to us, we are apt to think of it more frequently, and we conclude that feeling, as a secondary law, influences our associations, and according to the feeling with which it is accompanied, so do ideas come up.

Method of Residues.—On contemplating kind actions, we feel a pleasure which can be explained by our social feelings; but we find that on contemplating some of these we have a feeling of moral approbation. This cannot be explained by the mere social feeling, and we have to call in a moral principle.

SECTION IX.

NATURAL THEOLOGY.

Attempts have been made to conduct this science on the joint dogmatic and deductive method, but, in my opinion, without much success. It has to deal with facts, the existence of God and the immortality of the individual soul, and therefore must have an inductive or observational element. I have my doubts whether, from a mere idea or principle in the mind, we can argue the existence of the living God. It should proceed, I reckon, mainly in the joint inductive and deductive method. It looks at God's works within and without us, and, discovering wonderful mutual fittings, means and end, traces of love and just government, it rises to the belief in a being of power, wisdom, benevolence, and justice. The inductions are collected in such works as Ray's "Wisdom of God," in Paley's

"Natural Theology," in the Bridgewater treatises, and the ordinary works of natural religion.

But there are deductive processes involved. The premises here are supplied mainly by *à priori* principles or by intuition, all to be justified by the criteria of First Truths. In the mind of man there are high and deep truths in the germ, all capable of being developed and actually working in the mature man, being called forth by the circumstances in which he is placed. There is the principle of causation, requiring us, on a new thing or a change appearing, to seek for a cause. This can stand the tests of intuition, being self-evident, necessary, universal, in our very nature and constitution, and it leads us to believe that where there are traces of design there must be a designer. There is a moral power within us, with its law and its obligations, implying a law-giver. We have not an adequate idea of infinity, but we believe that there is something beyond our widest idea or concept, something to which nothing can be added, and we are led to apply it to the powerful, the good and holy One.

We are entitled, we are required, to trust and follow these principles. They are elements and the highest elements of the reason with which we are endowed. We begin with trusting the senses, and find, as we do so, constant confirmations in our daily experience; what appeared at first to be realities we discover to be more real as we bring one sense after another to bear upon them, and find that meat nourishes us and pure air refreshes us, and the due use of the good things of this world prolongs life. We should confide in the same way in our higher ideas and beliefs, and as we do so we find them expanding and elevating the mind, opening grand vistas which look beyond the seen and temporal into the unseen and eternal. If we do not follow our lower instincts, if

we do not eat and drink, our bodies will become feeble and die; and if we deny our higher reason, our souls will lose their freshness, vigor, and aspirations.

But when we would construct the argument, indeed, in all scientific investigations and in all true philosophy we must be careful to ascertain the exact nature of the intuitions or intuitive reason we call in, and only use them accordingly. Those who neglect this are sure to present them in an extravagant form or make a perverted use of them. This has been done by the mystics of the East and of mediæval times, indeed, of all ages. Almost always they have got a glimpse of a reality, but they have seen it only under partial aspects, and they have shown it to us through a cloud, or irradiated it with reflected light, and have represented it to us as vision, inspiration, and ecstacy, whereas it is only one of the higher elevations of our nature.

All our profound thinkers have seen these truths, but have not always properly represented them. We may hold with Plato that there is a grand, indeed, a Divine idea; but I wish that idea, as in the mind, carefully examined, and its forms or law exactly determined, and it is for inductive science, and not speculation, to tell us what are the types which represent it in nature. I hold with Aristotle that there are formal and final as well as material and efficient causes in nature; but it is for a careful induction to determine the nature of these and to show how matter and force are made to work for order and for ends. I am as sure as Descartes, and as Augustine and Anselm were before him, that there is in the mind a germ of the idea of the infinite and perfect; but we must show what is the precise nature of the idea, so as to secure that we draw only legitimate inferences from it. I discover, as Leibnitz did, a pre-established harmony in nature, but it

consists mainly, not in things acting independently of each other, but in the harmony produced by things acting on each other. I attach as much importance to experience as Locke did, but I maintain that observation discovers that the intuition (which he acknowledged) looks at principles in the mind prior to all experience. I allow to Kant his forms, his categories, and his ideas, but their nature is to be discovered, not by criticism, but by induction, when they will be found not to superinduce qualities on things, but simply to enable us to perceive what is in things. I believe with Schelling in intuition (Anschauung), but it is an intuition viewing realities. I hold with Hegel that there is an Absolute, but I believe that our knowledge, after all, is finite, implying an infinite, and that the doctrine can be enunciated so as not to issue in pantheism. I turn away with scornful aversion from the pessimism of Schopenhauer and Von Hartmann, but I believe they have done good by calling attention to the existence of evil, to remove which is an end worthy of the labors and sufferings of the Son of God. I believe with Herbert Spencer in a vast unknown above, beneath, and around us, but I rejoice in a light shining in the darkness and revealing the known. I believe in the gems so rich and varied which the higher poets have left us as a rich inheritance; but before they can enter into philosophy they must be cut and set, and it will require a skilful hand to adjust them, and when they are cut it must be as skilfully as diamonds are, and this only to show more fully their form and beauty.

SECTION X.

THE SUPERNATURAL.

We have to posit the Supernatural as the origin of the natural. This we do on the principle of cause and effect. We discover in nature evidences of its being an effect. It has, as Sir John Herschel says, the appearance of "a manufactured article." This is seen particularly in the adaptation of one thing to another all throughout nature. We argue a cause above and beyond nature, and this is Supernatural.

Miracles.—It is asserted that in the very midst of the natural occurrences there are events which cannot be accounted for by natural agents. These are called miracles. Of most of these, when we examine them, we find that they cannot stand our criteria; they are the products of superstitious fears and of credulity. But there are events recorded in the Old and New Testaments which are worthy of having the tests of truth applied to them. These are not to be regarded as occurring without a cause. They are not inconsistent with the intuitive conviction of causation. They have a sufficient cause in that power in which nature originated. We are only following out the principle of causation in arguing thus. We rise to a supernatural cause because there is no agent in nature adequate to produce such occurrences as the resurrection of Lazarus or Jesus.

I would not describe miracles with Hume, as "violations of the laws of nature;" but they cannot be accounted for by these laws. They do not fall in with that general fact that every event has not only a cause in God but a cause in a physical agent. As physical agents cannot produce them, we argue that they are effected by the immediate power of God. Further, they are

not in accordance with the uniformity of nature. It is not in conformity with this that fishermen and mechanics of Galilee should produce our Lord's discourses. They accomplish their ends, in guaranteeing revealed truth, because they are above the causes and laws of nature.

The evidences of Christianity are of two kinds: one internal and the other external. The external are facts attested by witnesses, whose depositions are to be tested by the criteria of testimony. The others are those derived from the suitableness of the truth revealed to our nature, moral and spiritual, to our sinful state and our wants. Take the Sermon on the Mount as so conformable to our moral nature. Take the life and character of Jesus, so perfect, so full of love in a world of sin and selfishness. Take his sufferings and his death, so fitted to accomplish their avowed end, that is, make atonement for sin.

There is proof of a uniformity of laws in nature, not from intuition, but the combined result of the experience of all times and countries. But it can be shown that there is a like uniformity in revelation, in its types, its prophecies, its doctrines. Its miracles are of a certain kind. Those of our Lord were mostly the healing of diseases, the cure of evils. Each one is part of a system; each part bearing up the others and the whole. By the one uniformity we are sure that every event is according to law. By the other we find a conformity in a whole supernatural system.

SECTION XI.

CONCLUSION—LIMITS TO HUMAN KNOWLEDGE.

The aim of this treatise has been to show that the human mind is capable of reaching knowledge, and that it has tests to determine when it has done so. I have faced the agnostic, but have not entered into a wrestling with him, which would be endless, because he refuses to take a form by which I may lay hold of him. I have pursued a more effectual method. I have shown objects where he assures us that there is nothing. It is in this way we can command assent and gain assurance.

I have proceeded on the idea that there is a difference in the certitude of truths. Some I have shown are self-evident, necessary, and universally held, and therefore certain beyond doubt or dispute; others are only probable, some with only a slight balance in their favor, others rising to certainty. This is not so much a difference in the truths as a difference in the evidence to us. To God and to higher beings, the one kind may be as certain as the other. We cannot tell whether there will or will not be a good harvest next year. But to Omniscience it may be as certain that there is to be a good harvest as that all the angles of a triangle are equal to two right angles. It is of vast moment that we should know what kind of evidence we have, and what the validity of the evidence which we have in favor of any proposition we are required to believe, whether it is demonstrative or merely probable, and if only probable, what the degree of probability. It is also of moment that we should note what kind of truth admits of apodictic and what of only probable proof. It is vain to seek for demonstration in every kind of investigation. We can have such, as I reckon, only when we have

self-evident truth. But, then, it can be shown that inductive truth can rise to certainty. I doubt much whether we have immediate evidence of the existence of God as we have of the existence of ourselves. But we have quite as valid proof of the existence of God as we have of the existence of our fellow-men; in both we have a fact, the acts done, and we rise up by the principle of causation to a cause. The criteria of truth which I have been furnishing should assist us in all such investigations.

Man's knowledge is increasing and must continue to increase. His generalizations widen as his knowledge increases and take in more and more objects. He is constantly gaining more premises which lead to farther conclusions. One discovery leads on to another; one chamber opened shows us the door which opens into a second. Davy proved the correlation of electric and magnetic forces, Oersted of electric and magnetic, and at last the grand doctrine disclosed itself to a number of investigators, particularly to Mayer, that all the physical forces are correlated.

But man's power of discovering truth is and ever must be limited. First, there are limits to his mental powers. He has only five original inlets of knowledge into the material world. Had he fifty senses instead of five he might know vastly more. Then, his power of working on the materials required by sense and consciousness, his memory and his understanding, are also limited. Some men can discover more truth than others, and it is conceivable that there may be higher intelligences who see farther into the nature of things than the most far-sighted of men. Secondly, every man's individual experience is limited, and the same may be said of the experience of the race—it is confined within very stringent bounds.

Man can discover a vast amount of truth, speculative

and practical. We have enough revealed to exercise our faculties, to expand and elevate the mind, and to serve for all the purposes of the duty we owe to God, to ourselves, and our fellow-men. Every truth known leads, however, into the unknown. But this is to tempt us to penetrate into the unknown region that we may know it.

As we do so we shall find that there are things beyond our ken in a region beyond, above, or beneath us, and we must be content to allow them to lie there. We know as much as to know that there are truths which we cannot know. We see the objects within our proper range of vision, but we also see the darkness that encompasses them. "We know in part." Yes, we know, but we know only in part.

We who dwell in a world "where day and night alternate;" we who go everywhere accompanied by our own shadow—a shadow produced by our dark body, but produced because there is light—cannot expect to be absolutely delivered from the darkness. Man's faculties, exquisitely adapted to the sphere in which he moves, were never intended to enable him to comprehend all truth. The mind is in this respect like the eye. The eye is so constituted as to perceive things within a certain range, but as objects are removed farther and farther from us they become more indistinct, and at length are lost sight of altogether. It is the same with the intellect of man. It can penetrate a certain distance and understand certain subjects, but as they stretch away farther they look more and more confused, and at length they disappear from the view. And if the human spirit attempts to mount higher than its limited range, it will find all its flights fruitless. The dove, to use a well-known illustration of Kant's, may mount to a certain height in the heavens; but as she rises the air becomes lighter, and at length she finds that she

can no longer float upon its bosom, and should she attempt to soar higher her pinions flutter in emptiness, and she falters and falls. So it is with the spirit of man: it can wing its way a very considerable distance into the expanse above it, but there is a boundary which if it attempts to pass, it will find all its conceptions void and its ratiocinations unconnected.

Placed as we are in the centre of boundless space and in the middle of eternal ages, we can see only a few objects immediately around us, and all others fade in outline as they are removed from us by distance, till at length they lie altogether beyond our vision. And this remark holds true not only of the more ignorant, of those whose eye can penetrate the least distance; it is true also of the learned; it is perhaps true of all created beings that there is a bounding sphere of darkness surrounding the space rendered clear by the torch of science. Nay, it almost looks as if the wider the boundaries of science are pushed, and the greater the space illuminated by it, the greater in proportion the bounding sphere of darkness into which no rays penetrate, just as (to use a very old comparison) when we strike up a light in the midst of darkness, in very proportion as the light becomes stronger so does also that surface dark and black which is rendered visible.

PROGRAMME OF A PHILOSOPHIC SERIES.

For the last thirty years I have been taking my part in the philosophic discussions of the age. I have a few things yet to say before I willingly leave the arena. These have long occupied my thoughts, and they relate to thrilling topics of the day on which many are anxious to have light thrown. In order to bring my views before the thinking public, I start A PHILOSOPHIC SERIES to consist of small volumes, of about sixty pages each, in stout paper, at Fifty Cents per volume, and issued quarterly, and each embracing an exposition complete in itself of one theme. I begin with

I. THE CRITERIA OF DIVERSE KINDS OF TRUTH AS OPPOSED TO AGNOSTICISM BEING A TREATISE ON APPLIED LOGIC. — This will confront me with the leading philosophic heresy of the day, which is working secretly where it does not appear above ground and undermining some of our most precious faiths. It has been shown again and again that Agnosticism is suicidal. It is an evident contradiction to affirm that we know that we can know nothing. But when we have done all this we have only strengthened the position of Agnosticism which holds that all truth is contradictory. Without entering into a wrestling match with a spectre I have set before the mind the truth which is seen in its own light. It has again and again been shown that we have no one absolute criterion of all truth. I have allowed this and approached the subject in a different way, and I show that we have now satisfactory criteria of the diverse kinds of truth which we are required to believe. The little treatise which can be read in a few hours is intended to give assurance to thinking minds, especially young men, in this age of unsettled opinion. It may also be used as a text-book in our upper schools. It may be followed by

II. ON THE NATURE OF CAUSATION IN RELATION TO THE LATELY DISCOVERED DOCTRINE OF THE CONSERVATION OF ENERGY OR THE PERSISTENCE OF FORCE. — It is a fact that most scientific men now acknowledge that they do not know what to make of the doctrine of Causation. The old doctrine is as true as ever that every effect implies a cause, but it requires to be modified and explained anew in conformity with recent science.

III. ON WHAT DEVELOPMENT CAN DO AND WHAT IT CAN NOT DO.— Religious people in the present day do not very well know what to make of Development. Irreligious people are turning it to the worst of purposes, making it supersede the power of God. Surely some good may be done by explaining what is meant by Development which is just a form of causation, which can do much, but can not do everything.

IV. A CRITICISM OF THE PHILOSOPHY OF KANT—Specifying its truths and its errors.—Kantism is the most influential philosophy of the day both in Europe and America. Kant has established a body of most important philosophic truth, but without meaning it he has allowed principles which are fitted to undermine our knowledge and the reality of things.

V. A CRITICISM OF HERBERT SPENCER'S PHILOSOPHY AS CULMINATED IN HIS ETHICS.—Mr. Spencer is the most powerful speculative thinker of our day and we now see the full philosophic and practical issue of the principles which he has been developing for many years in eight or ten volumes. It is surely desirable to have these principles thoroughly sifted.

But I have proposed enough till such time as I find that my project is to be countenanced by the friends of a sober philosophy.

JAMES McCOSH.

*** *NOTICE.—Orders for THE CRITERIA OF DIVERSE KINDS OF TRUTH (Ready Oct. 12th, 1882), and subscriptions for the entire series, will be received by*

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CHAPTERS IN LOGIC;

CONTAINING

SIR WILLIAM HAMILTON'S LECTURES ON MODIFIED LOGIC,

AND SELECTIONS FROM

THE PORT ROYAL LOGIC.

WITH PREFACE

BY THE

REV. S. S. NELLES, D.D.,

Professor of Logic in Victoria College.

TORONTO:

THE WESLEYAN METHODIST BOOK-ROOM,

83, KING STREET EAST.

1870.

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PREFACE.

THIS little volume is a reprint of Sir WILLIAM HAMILTON'S *Lectures on Modified Logic*, and of the most valuable portions of the famous *Port Royal Logic*, translated by T. S. BAYNES. The design of the publication is to provide, in cheap and convenient form, a Manual or Text-Book, on what Hamilton calls "Modified or Concrete Logic," but what others have variously designated as Applied or Practical Logic.

Whatever may be thought of the propriety of including this department of study within the science of Logic, there can be no doubt of its very great importance, and just as little doubt of its having been sadly neglected. Those who have not mastered the elements of formal or technical Logic, as well as those who have, may derive immense advantage from a careful perusal of these pages.

The merits of Sir William Hamilton are so well known, that it is perhaps unnecessary here to say anything in commendation of that part of the volume which was written by him. It may, however, be well to mention,

that his *Lectures on Modified Logic* are here given in full, without alteration either of the arrangement or the text. From the nature of their topics, they form a distinct discussion in themselves, and suffer nothing in being separated from the other lectures in which the eminent author has so ably treated of the formal laws of thought.

The other work,—the *Port Royal Logic*,—is less generally known, but is regarded by high authorities as one of the very best of the many books extant on the science of Logic. "The treatise," says Mr. Baynes, "is characterised throughout by a vigor of thought, a vivacity of criticism, a freshness and variety of illustration, an honesty and love of truth, and withal a human sympathy, which rendered it a work not only of specific scientific value, but of general interest and instruction. Logic was thus redeemed from the contempt into which it had fallen, and placed on a level with the advancing philosophy of the time."

To this may be added the testimony of Baron de Gerando, as cited by Mr. Baynes. Speaking of the parts which especially merit praise, he says,—"Above all, that beautiful Dissertation on the Origin of Prejudices, and their influence on the vices of reasoning in civil life. This Dissertation, indeed, constitutes, of itself, an entirely new Logic —one almost sufficient, and far more important than all the apparatus of the peripatetic Logic; and it must be recorded to the praise of the Port Royal writers that this is a part of their work which is peculiarly their own."

Dugald Stewart, also, in his *Dissertation on the Progress of Philosophy*, speaks of the *Port Royal Logic* as "a treatise of which it is hardly possible to estimate the merits too highly." And again:—"No publication certainly, prior to *Locke's Essay*, can be named, containing so much good sense and so little nonsense on the science of Logic; and very few have *since* appeared on the same subject which can be justly preferred to it in point of practical utility. If the author had lived in the present age, or had been less fettered by a prudent regard to existing prejudices, the technical part would probably have been reduced within a still narrower compass; but even there he has contrived to substitute, for the puerile and contemptible examples of common logicians, several interesting illustrations from the physical discoveries of his immediate predecessors; and has indulged himself in some short excursions, which excite a lively regret that he has not more frequently and freely given scope to his original reflections. Among these excursions, the most valuable, in my opinion, is *the Twentieth Chapter of the Third Part*, which deserves the attention of every logical student, as an important and instructive supplement to the enumeration of sophisms given by Aristotle."

The Editor of this compilation has confined his selections from the *Port Royal Logic* to this "twentieth chapter," which is given entire (with the exception of a few lines), and to those portions of the Preliminary Discourse which

are of general application. These selections make a suitable introduction to the Lectures of Hamilton on *Modified Logic*, and the two together furnish about the best instruction that can be had on this important branch of the science of Logic.

We live in times remarkable for the awakening and emancipation of thought. This is matter of rejoicing; but freedom of thought brings corresponding dangers and responsibilities, and we cannot do too much to aid the inquiring multitudes in the proper use of that right of private judgment of which we are so justly proud. Works like the one here presented may serve to show that all intellectual activity has its laws, the violation of which brings invariable and heavy penalties; may teach us to beware of the immoralities of the intellect; may put those who are trying to think, in the way of thinking soundly, by furnishing them with the best rules and cautions known to the world's great thinkers; and may help us forward to that "good time coming," when in moral, political, and religious affairs, men shall proceed with something like the steadiness, precision, and certainty, which have already begun to mark the pursuit of mathematical and physical science.

VICTORIA COLLEGE,
March 31st, 1870.

THE PORT-ROYAL LOGIC

CHAPTER I.

PRELIMINARY—IN WHICH THE DESIGN OF THIS NEW LOGIC IS SET FORTH.

THERE is nothing more desirable than good sense, and accuracy of thought, in discriminating between truth and falsehood. All other qualities of mind are of limited use; but exactness of judgment is of general utility in every part, and in all the employments of life. It is not alone in the sciences that it is difficult to distinguish truth from error, but also in the greater part of those subjects which men discuss in their every-day affairs. There are, in relation to almost everything, different routes—the one true, the other false—and it is reason which must choose between them. Those who choose well, are they who have minds well-regulated; those who choose ill, are those who have minds ill-regulated: and this is the first and most important difference which we find between the qualities of men's minds.

Thus the main object of our attention should be, to form our judgment, and render it as exact as possible; and to this end, the greater part of our study ought to tend. We

employ reason as an instrument for acquiring the sciences; whereas, on the contrary, we ought to avail ourselves of the sciences as an instrument for perfecting our reason—justness of mind being infinitely more important than all the speculative knowledges which we can obtain, by means of sciences the most solid and well-established. This ought to lead wise men to engage in these only so far as they may contribute to that end, and to make them the exercise only, and not the occupation, of their mental powers.

If we have not this end in view, the study of the speculative science—such as geometry, astronomy, and physics—will be little else than a vain amusement, and scarcely better than the ignorance of these things, which has at least this advantage—that it is less laborious, and affords no room for that empty vanity which is often found connected with these barren and unprofitable knowledges. These sciences not only have nooks and hidden places of very little use; they are even totally useless, considered in themselves, and for themselves alone. Men are not born to employ their time in measuring lines, in examining the relations of angles, and considering the different movements of matter; their minds are too great, their life too short, their time too precious, to be engrossed with such petty objects: but they ought to be just, equitable, prudent, in all their converse, in all their actions, and in all the business they transact; and to these things they ought specially to discipline and train themselves. This care and study are so very neccessary, that it is strange that this exactness of judgment should be so rare a quality. We find, on every side, ill-regulated minds which have scarcely any discernment of the truth; men who receive all things with a wrong bias; who allow themselves to be carried away by the slightest appearances; who are always

in excess and extremes; who have no bond to hold them firm to the truths which they know, since they are attached to them rather by chance than by any clear insight; or who, on the other hand, entrench themselves in their opinions with such obstinacy, that they will not listen to anything that may undeceive them; who determine rashly about that of which they are ignorant, which they do not understand, and which, perhaps, no one ever can understand; who make no difference between one speech and another, or judge of the truth of things by the tone of voice alone,—he who speaks fluently and impressively being in the right, he who has some difficulty in explaining himself, or displays some warmth, in the wrong: they know nothing beyond this.

Hence it is, that there are no absurdities too groundless to find supporters. Whoever determines to deceive the world, may be sure of finding people who are willing enough to be deceived; and the most absurd follies always find minds to which they are adapted. After seeing what a number are infatuated with the follies of judicial astrology, and that even grave persons treat this subject seriously, we need not be surprised at anything more. There is a constellation in the heavens which it has pleased certain persons to call the Balance, and which is as much like a balance as a windmill. The Balance is the symbol of justice; those, therefore, that are born under that constellation, will be just and equitable. There are three other signs in the zodiac, which are called, one the Ram, another the Bull, another the Goat, and which might as well have been called the Elephant, the Crocodile, and the Rhinoceros. The Ram, the Bull, and the Goat, are ruminant animals; those, therefore, who take medicines when the moon is under

these constellations, are in danger of vomiting them again. Such extravagant reasonings as these have found persons to propagate them, and others who allow themselves to be persuaded by them.

This inaccuracy of thought is the cause, not only of the errors we meet with in the sciences, but also the majority of the offences which are committed in civil life,—of unjust quarrels, unfounded lawsuits, rash counsel, and ill-arranged undertakings. There are few of these which have not their origin in some error, and in some fault of judgment, so that there is no defect which it more concerns us to correct. But this correction is as difficult of accomplishment as it is desirable, since it depends very much on the measure of intelligence with which we are endowed. Common-sense is not so common a quality as we imagine. There are a multitude of minds heavy and dull, which we cannot reform by giving them the understanding of the truth, but only by restricting them to those things which are suited to them, by withholding them from judging about those things which they are not capable of knowing. It is true, nevertheless, that a great part of the false judgment of men does not spring from this principle, but is caused solely by precipitancy of mind and want of attention, which lead us to judge rashly about that which we know only obscurely and confusedly. The little love men have for truth leads them to take no pains, for the most part, in distinguishing what is true from what is false. They allow all sorts of reasonings and maxims to enter their minds; they like better to suppose things true, than to examine them; if they do not comprehend them, they are willing to believe that others understand them well: and thus they fill the memory with a mass of things false, obscure, and unintelli-

gible, and then reason on these principles, scarcely considering at all either what they speak or what they think. Vanity and presumption contribute still more to this effect. We think it a disgrace to doubt, and to be ignorant; and we prefer rather to speak and determine at random, than to confess that we are not sufficiently informed on the subject to give an opinion. We are all of us full of ignorance and errors; and yet it is the most difficult thing in the world to obtain from the lips of man this confession, so just, and so suited to his natural state,—I am in error, and I know nothing about the matter.

We find others, on the contrary, who, having light enough to know that there are a number of things obscure and uncertain, and wishing, from another kind of vanity, to show that they are not led away by the popular credulity, take a pride in maintaining that there is nothing certain. They thus free themselves from the labour of examination, and on this evil principle they bring into doubt the most firmly established truths, and even religion itself. This is the source of Pyrrhonism [or Scepticism], another extravagance of the human mind which, though apparently opposed to the rashness of those who believe and decide everything, springs nevertheless from the same source, which is, want of attention. For as the one will not give themselves the trouble of discerning errors, the others will not look upon truth with that care which is necessary to perceive its evidence. The faintest glimmer suffices to persuade the one of things very false, and to make the other doubt of things the most certain; and in both cases it is the same want of application which produces effects so different.

True reason places all things in the rank which belongs to them; it questions those which are doubtful, rejects those

which are false, and acknowledges, in good faith, those which are evident, without being embarrassed by the vain reasons of the Pyrrhonists, which never could, even in the minds of those who proposed them, destroy the reasonable assurance we have of many things. None ever seriously doubted the existence of the sun, the earth, the moon, or that the whole was greater than its parts. We may indeed easily say outwardly with the lips that we doubt of all these things, because it is possible for us to lie; but we cannot say this in our hearts. Thus Pyrrhonism is not a sect composed of men who are persuaded of what they say, but a sect of liars. Hence they often contradict themselves in uttering their opinion, since it is impossible for their hearts to agree with their language. We see this in Montaigne, who attempted to revive this sect in the last century; for, after having said that the Academics were different from the Pyrrhonists, inasmuch as the Academics maintained that some things were more probable than others, which the Pyrrhonists would not allow, he declares himself on the side of the Pyrrhonists in the following terms: "The opinion," says he, "of the Pyrrhonists is bolder, and much more probable." There are, therefore, some things which are more probable than others. Nor was it for the sake of effect that he spoke thus: these are words which escaped him without thinking of them, springing from the depths of nature which no illusion of opinions can destroy. But the evil is, that in relation to those things which are more removed from sense, these persons, who take a pleasure in doubting everything, withhold their mind from any application, or apply it only imperfectly to that which might persuade them, and thus fall into a voluntary uncertainty in relation to the affairs of religion; for the state of darkness into which they have

brought themselves is agreeable to them, and very favourable for allaying the remorse of their conscience, and for the unrestrained indulgence of their passions. Thus, these disorders of the mind, though apparently opposed (the one leading to the inconsiderate belief of what is obscure and uncertain, the other to the doubting of what is clear and certain), have nevertheless a common origin, which is, the neglect of that attention which is necessary in order to discover the truth. It is clear, therefore, that they must also have a common remedy, and that the only way in which we can preserve ourselves from them is by fixing minute attention on our judgments and thoughts. This is the only thing that is absolutely necessary to preserve us from deceptions. For that which the Academics were wont to say,—that it was impossible to discover the truth unless we had its characters, as it would be impossible to identify a runaway slave we might be in search of, unless we had some signs by which, supposing we were to meet him, we could distinguish him from others,—is only a vain subtlety. As no marks are necessary in order to distinguish light from darkness but the light which reveals itself, so nothing else is necessary in order to recognize the truth but the very brightness which environs it, and which subdues and persuades the mind, notwithstanding all that may be said against it; so that all the reasonings of these philosophers are no more able to withhold the mind from yielding to the truth, when it is strongly imbued with it, than they are capable of preventing the eyes from seeing, when, being open, they are assailed by the light of the sun.

But since the mind often allows itself to be deceived by false appearances in consequence of not giving due attention to them, and since there are many things which cannot be

known, save by long and difficult examination, it would certainly be useful to have some rules for its guidance, so that the search after truth might be more easy and certain. Nor is it impossible to secure such rules: for since men are sometimes deceived in their judgments, and at other times are not deceived, as they reason sometimes well and sometimes ill, and as, after they have reasoned ill, they are able to perceive their error, they may thus notice, by reflecting on their thoughts, what method they have followed when they have reasoned well, and what was the cause of their error when they were deceived; and thus on these reflections form rules by which they may avoid being deceived for the future.

This is what philosophers have specially undertaken to accomplish, and in relation to which they make such magnificent promises. If we may believe them, they will furnish us, in that part which is devoted to that purpose, and which they call *logic*, with a light capable of dispelling all the darkness of the mind; they correct all the errors of our thoughts; and they give us rules so sure that they conduct us infallibly to the truth,—so necessary, that without them it is impossible to know anything with complete certainty. These are the praises which they have themselves bestowed on their precepts. But if we consider what experience shows us of the use which these philosophers make of them, both in logic and in other parts of philosophy, we shall have good grounds to suspect the truth of their promises.

Since it is not, however, just to reject absolutely the good there is in logic because of the abuse which has been made of it, and as it is not possible that all the great minds which have applied themselves with so much care to the rules of reasoning, have discovered nothing at all solid; and finally,

since custom has rendered it necessary to know (at least generally) what logic is, we believed that it would contribute something to public utility to select from the common logics whatever might best help towards forming the judgment. This is the end we specially propose to ourselves in this work ; with the view of accomplishing which, we have inserted many new reflections which have suggested themselves to our mind while writing it, and which form the greatest and perhaps the most important part of it, for it appears the common philosophers have attempted to do little more than to give the rules of good and bad reasoning. Now, although we cannot say these rules are useless, since they often help to discover the vice of certain intricate arguments, and to arrange our thoughts in a more convincing manner, still this utility must not be supposed to extend very far. The greater part of the errors of men arise, not from their allowing themselves to be deceived by wrong conclusions, but in their proceeding from false judgments, whence wrong conclusions are deduced. Those who have previously written on logic have little sought to rectify this, which is the main design of the new reflections which are to be found scattered through this book.

These, in brief, are the views we have had in writing this Logic. Perhaps, after all there are few persons who will profit by it, or be conscious of the good they have obtained, because but little attention is commonly given to putting precepts in practice by express reflections on them. But we hope, nevertheless, that those who have read it with some care may receive an impression which will render them more exact and solid in their judgments, even without their being conscious of the good, as there are some remedies

which cure diseases by increasing the vigour and fortifying the parts. Be this as it may, it cannot trouble any one long,—since those who are a little advanced may read and understand it in seven or eight days; and it will be strange if, containing so great a diversity of things, each does not find something to repay him for the trouble of a perusal.

CHAPTER II.

OF THE BAD REASONINGS WHICH ARE COMMON IN CIVIL LIFE AND IN ORDINARY DISCOURSE.

We have seen some examples of the faults which are most common in reasoning on scientific subjects; but since the principal use of reason is not in relation to those kinds of subjects which enter but little into the conduct of life, and in which there is much less danger of being deceived, it would, without doubt, be much more useful to consider generally what betrays men into the false judgments which they make on every kind of subject,—especially on that of morals, and of other things which are important in civil life, and which constitute the ordinary subject of their conversation. But, inasmuch as this design would require a separate work, which would comprehend almost all the whole of morals, we shall content ourselves with indicating here, in general, some of the causes of those false judgments which are so common amongst men.

We do not stay to distinguish false judgments from bad reasonings, and shall inquire indifferently into the causes of each,—both because false judgments are the sources of bad reasonings, and produce them as a necessary consequence, and because in reality there is almost always a concealed and enveloped reasoning in what appears to be a simple judgment, there being always something which operates on

the motive and principle of that judgment. For example, when we judge that a stick which appears bent in the water is really so, this judgment is founded on that general and false proposition, that what appears bent to our senses is so really, and thus contains an undeveloped reasoning.

In considering them generally, the causes of our errors appear to be reducible to two principles: the one internal —the *irregularity of the will*, which *troubles and disorders the judgment;* the other external, which lies in the *objects of which we judge*, and which deceive our minds by *false appearances*. Now although these causes almost always appear united together, there are nevertheless certain errors, in which one prevails more than the other; and hence we shall treat of them separately.

OF THE SOPHISMS OF SELF-LOVE, OF INTEREST, AND OF PASSION.

I.

If we examine with care what commonly attaches men rather to one opinion than to another, we shall find that it is not a conviction of the truth, and the force of the reasons, but some bond of self-love, of interest, or of passion. This is the weight which bears down the scale, and which decides us in the greater part of our doubts. It is this which gives the greatest impetus to our judgments, and which holds us to them most forcibly. We judge of things, not by what they are in themselves, but by what they are in relation to us, and truth and utility are to us but one and the same thing.

No other proofs are needed than those which we see every day, to show that the things which are held everywhere else as doubtful, or even as false, are considered most certain

by all of some one nation, or profession, or institution. For, since it cannot be that what is true in Spain should be false in France, nor that the minds of all Spaniards are so differently constituted from those of Frenchmen, as that, judging by the same rules of reasoning, that which appears generally true to the one should appear generally false to the others, it is plain that this diversity of judgment can arise from no other cause except that the one choose to hold as true that which is to their advantage; and that the others, having no interest at stake, judge of it in a different way.

Nevertheless, what can be more unreasonable than to take our interest as the motive for believing a thing? All that it can do, at most, is to lead us to consider with more attention the reasons which may enable us to discover the truth of that which we wish to be true; but it is only the truth which must be found in the thing itself, independently of our desires, which ought to convince us. I am of such a country; therefore I must believe that such a saint preached the gospel there. I am of such an order; therefore I must believe that such a privilege is right. These are no reasons. Of whatever order, and of whatever country you may be, you ought to believe only what is true; and what you would have been disposed to believe, though you had been of another country, of another order, and of another profession.

II.

But this illusion is much more evident when any change takes place in the passions; for, though all things remain in their place, it appears, nevertheless, to those who are moved by some new passion, that the change which has taken place in their own heart alone has changed all external things which have any relation to them. How often do we see

persons who are able to recognize no good quality, either natural or acquired, in those against whom they have conceived an aversion, or who have been opposed in something to their feelings, desires, and interests! This is enough to render them at once, in their estimation, rash, proud, ignorant, without faith, without honour, and without conscience. Their affections and desires are not any more just or moderate than their hatred. If they love any one, he is free from every kind of defect. Everything which they desire is just and easy, everything which they do not desire is unjust and impossible, without their being able to assign any other reason for all these judgments than the passion itself which possesses them; so that, though they do not expressly realize to their mind this reasoning: I love him; therefore, he is the cleverest man in the world: I hate him; therefore, he is nobody;—they realize it to a great extent in their hearts; and therefore, we may call sophisms and delusions of the heart those kinds of errors which consist in transferring our passion to the objects of our passions, and in judging that they are what we will or desire that they should be; which is without doubt very unreasonable, since our desires can effect no change in the existence of that which is without us, and since it is God alone whose will is efficacious enough to render all things what he would have them to be.

III.

We may reduce to the same illusion of self-love that of those who decide everything by a very general and convenient principle, which is, that they are right, that they know the truth; from which it is not difficult to infer that those who are not of their opinion are deceived,—in fact, the conclusion is necessary.

The error of these persons springs solely from this, that the good opinion which they have of their own insight leads them to consider all their thoughts as so clear and evident, that they imagine the whole world must accept them as soon as they are known. Hence it is that they so rarely trouble themselves to furnish proofs,—they seldom listen to the opinions of others, they wish all to yield to their authority, since they never distinguish their authority from reason. They treat with contempt all those who are not of their opinion, without considering that if others are not of their opinion, so neither are they of the opinion of others, and that it is unjust to assume, without proof, that we are in the right when we attempt to convince others, who are not of our opinion, simply because they are persuaded that we are not in the right.

IV.

There are some, again, who have no other ground for rejecting certain opinions than this amusing reasoning:—If this were so, I should not be a clever man; now, I am a clever man; therefore, it is not so. This is the main reason which, for a long time, led to the rejection of some most useful remedies, and most certain discoveries; for those who had not known them previously fancied that, by admitting them, they would have confessed themselves to have been hitherto deceived. "What," said they, "if the blood circulate; if the food is not carried to the liver by the mesaraic veins; if the venous artery carry the blood to the heart; if the blood rise by the descending hollow vein; if nature does not abhor a vacuum; if the air be heavy and have a movement below,—I have been ignorant of many important things in anatomy and in physics.

these things, therefore, cannot be." But, to remedy this folly, it is only necessary to represent fully to such, that there is very little discredit in being mistaken, and that they may be accomplished in other things, though they be not in those which have been recently discovered.

V.

There is, again, nothing more common than to see people mutually casting on each other the same reproaches, and accusing one another—for example, of obstinacy, passion, and chicanery—when they are of different opinions. There are scarcely any advocates who do not accuse each other of delaying the process, and concealing the truth by artifices of speech; and thus those who are in the right, and those who are in the wrong, with almost the same language make the same complaints, and attribute to each other the same vices. This is one of the most injurious things possible in the life of men, for it throws truth and error, justice and injustice, into an obscurity so profound, that the world, in general, cannot distinguish between them; and hence it happens, that many attach themselves, by chance and without knowledge, to one of these parties, and that others condemn both as being equally wrong.

All this confusion springs, again, from the same malady which leads each one to take, as a principle, that he is in the right; for from this it is not difficult to infer, that all who oppose us are obstinate, since to be obstinate is not to submit to the right.

But still, although it be true that these reproaches of passion, of blindness, and of quibbling, which are very unjust on the part of those who are mistaken, are just and right on the part of those who are not so; nevertheless,

since they assume that truth is on the side of him who makes them, wise and thoughtful persons, who treat of any contested matter, should avoid using them, before they have thoroughly established the truth and justice of the cause which they maintain. They will never then accuse their adversaries of obstinacy, of rashness, of wanting common sense, before they have clearly proved this. They will not say, before they have shown it, that they fall into intolerable absurdities and extravagances; for the others, on their side, will say the same of them, and thus accomplish nothing. And thus they will prefer rather to observe that most equitable rule of St. Augustine:—*Omittamus ista communia, quæ dici ex utraque parte possunt, licet vere dici ex utraque parte non possint.* They will thus be content to defend truth by the weapons which are her own, and which falsehood cannot borrow. These are clear and weighty reasons.

VI.

The mind of man is not only in love with itself, but it is also naturally jealous, envious of and ill-disposed towards others. It can scarcely bear that they should have any advantage, but desires it all for itself; and as it is an advantage to know the truth, and furnish men with new views, a secret desire arises to rob those who do this of the glory, which often leads men to combat, without reason, the opinions and inventions of others.

Thus, as self-love often leads us to make these ridiculous reasonings: It is an opinion which I discovered, it is that of my order, it is an opinion which is convenient; it is, therefore, true; natural ill-will leads us often to make these others, which are equally absurd: Some one else said such

a thing; it is, therefore, false: I did not write that book; it is, therefore, a bad one.

This is the source of the spirit of contradiction so common amongst men, and which leads them, when they hear or read anything of another, to pay but little attention to the reasons which might have persuaded them, and to think only of those which they think may be offered against it; they are always on their guard against truth, and think only of the means by which it may be repressed and obscured—in which they are almost invariably successful, the fertility of the human mind in false reasons being inexhaustible.

When this vice is in excess, it constitutes one of the leading characteristics of the spirit of pedantry, which finds its greatest pleasure in quibbling with others on the pettiest things, and in contradicting everything with a pure malignity. But it is often more imperceptible and concealed; and we may say, indeed, that no one is altogether free from it, since it has its root in self-love, which always lives in men.

The knowledge of this malignant and envious disposition, which dwells deep in the heart of men, shows us that one of the most important rules which we can observe, in order to win those to whom we speak from error, and bring them over to the truth of which we would persuade them, is to excite their envy and jealousy as little as possible by speaking of ourselves, and the things which concern us.

For, since men love scarcely any but themselves, they cannot bear that another should intrude himself upon them, and thus throw into shade the main object of their regard. All that does not refer to themselves is odious and impertinent, and they commonly pass from the hatred of the man to the hatred of his opinions and reasons. Hence, wise persons avoid as much as possible revealing to others the

advantages which they have; they avoid attracting attention to themselves in particular; and seek rather, by hiding themselves in the crowd, to escape observation, in order that the truth which they propose may be seen alone in their discourse.

The late M. Pascal, who knew as much of true rhetoric as any one ever did, carried this rule so far as to maintain that a well-bred man ought to avoid mentioning himself, and even to avoid using the words *I* and *me;* and he was accustomed to say, on this subject, that Christian piety annihilated the human *me*, and that human civility concealed and suppressed it. This rule, however, is not to be observed too rigidly, for there are many occasions on which it would uselessly embarrass us to avoid these words; but it is always good to keep it in view, in order to preserve us from the wretched custom of some individuals, who speak only of themselves, and who quote themselves continually, when their opinion is not asked for. This leads those who hear them to suspect that this constant recurrence to themselves arises only from a secret pleasure, which leads them continually to that object of their love, and thus excites in them, by a natural consequence, a secret aversion to these people, and towards all that they say. This shows us that one of the characteristics most unworthy of a sensible man is that which Montaigne has affected in entertaining his readers with all his humours, his inclinations, his fancies, his maladies, his virtues, and his vices, which could arise only from a weakness of judgment, as well as a violent love for himself. It is true that he attempted, as far as possible, to remove from himself the suspicion of a low and vulgar vanity, by speaking freely of his defects, as well as of his good qualities, which has something amiable in it, from the appear-

ance of sincerity; but it is easy to see that all this is only a trick and artifice; which should only render it still more odious. He speaks of his vices in order that they may be known, not that they may be detested; he does not think for a moment that he ought to be held in less esteem; he regards them as things very indifferent, and rather as creditable than disgraceful; if he reveals them it gives him no concern, and he believes that he will not be, on that account, at all more vile or contemptible. But when he apprehends that anything will degrade him at all, he is as careful as any one to conceal it; hence, a celebrated author of the present day pleasantly remarks, that though he takes great pains, without any occassion, to inform us, in two places of his book, that he had a page, (an officer of very little use in the house of a gentleman of six thousand livres a-year) he has not taken the same pains to inform us that he had also a clerk, having been himself counsellor of the parliament of Bordeaux. This employment, though very honourable in itself, did not satisfy the vanity he had of appearing always with the air of a gentleman and of a cavalier, and as one unconnected with the brief and gown.

It is nevertheless probable, however, that he would not have concealed this circumstance of his life if he could have found some Marshal of France who had been counsellor of Bordeaux, as he has chosen to inform us that he had been mayor of that town, but only, after having informed us that he had succeeded Marshal De Biron in that office, and had been succeeded by Marshal De Matignon.

But the greatest vice of this author is not that of vanity, for he is filled with such a multitude of shameful scandals, and of epicurean and impious maxims, that it is wonderful that he has been endured so long by everybody, and

that there are even men of mind who have not discovered the poison.

No other proofs are necessary, in order to judge of his libertinism, than that very manner even in which he speaks of his vices; for allowing, in many places, that he had been guilty of a great number of criminal excesses, he declares, nevertheless, that he did not repent of them at all, and that if he had to live over again he would live as he had done. "As for me," says he, "I cannot desire in general to be other than I am. I cannot condemn my universal form, though I may be displeased with it, and pray God for my entire reformation, and for the pardon of my natural weakness; but this I ought not to call repentance any more than the dissatisfaction I may feel at not being an angel, or Cato; my actions are regulated and conformed to my state and condition; I cannot be better, and repentance does not properly refer to things which are not in our power. I never expected incongruously to affix the tail of a philosopher to the head and body of an abandoned man, or that the meagre extremity of my life was to disavow and deny the most beautiful, complete, and largest portion of the whole. If I had to live over again I would live as I have done; I do not lament over the past; I do not fear for the future." Awful words, which denote the entire extinction of all religious feeling, but which are worthy of him who said also, in another place: "I plunge myself headlong blindly into death, as into a dark and silent abyss, full of a mighty sleep, full of unconsciousness and lethargy, which engulphs me at once, and overwhelms me in a moment." And in another place: "Death, which is only a quarter of an hour's passion, without consequence, and without injury, does not deserve any special precepts."

Although this digression appears widely removed from this subject, it belongs to it nevertheless, for this reason—that there is no book which more fosters that bad custom of speaking of one's self, being occupied with one's self, and wishing all others to be so too. This wonderfully corrupts reason, both in ourselves, through the vanity which always accompanies these discourses, and in others, by the contempt and aversion which they conceive for us. Those only may be allowed to speak of themselves who are men of eminent virtue, and who bear witness by what means they have become so, so that if they make known their good actions, it is only to excite others to praise God for these, or to instruct them; and if they publish their faults, it is only to humble themselves before men, and to deter them from committing these. But for ordinary persons it is a ridiculous vanity to wish to inform others of their petty advantages; and it is insufferable effrontery to reveal their excesses to the world without expressing their sorrow for them, since the last degree of abandonment in vice is, not to blush for it, and to have no concern or repentance on account of it, but to speak of it indifferently as of anything else; in which mainly lies the wit of Montaigne.

VII.

We may distinguish to some extent from malignant and envious contradiction another kind of disposition not so bad, but which produces the same faults of reasoning; this is the spirit of debate, which is, however, a vice very injurious to the mind.

It is not that discussions, generally, can be censured. We may say on the contrary that, provided they be rightly used, there is nothing which contributes more towards

giving us different hints, both for finding the truth, and for recommending it to others. The movement of the mind, when it works alone in the examination of any subject, is commonly too cold and languid. It needs a certain warmth to inspire it, and awaken its ideas, and it is commonly through the varied opposition which we meet with that we discover wherein the obscurity and the difficulties of conviction consist, and are thus led to endeavor to overcome them.

It is true, however, that just in proportion as this exercise is useful when we employ it aright, and without any mixture of passion, so, in that proportion, is it dangerous when we abuse it, and pride ourselves on maintaining our opinion at whatever cost, and in contradicting that of others. Nothing can separate us more widely from the truth, and plunge us more readily into error, than this kind of disposition. We become accustomed, unconsciously, to find reasons for everything, and to place ourselves above reason by never yielding to it, which leads us by degrees to hold nothing as certain, and to confound truth with error, in regarding both as equally probable. This is why it is so rare a thing for a question to be determined by discussion; and why it scarcely ever happens that two philosophers agree. They always find replies and rejoinders, since their aim is to avoid not error but silence, and since they think it less disgraceful to remain always in error than to avow that they are mistaken.

Thus, unless at least we have been accustomed by long discipline to retain the perfect mastery over ourselves, it is very difficult not to lose sight of truth in debates, since there are scarcely any exercises which so much arouse our passions. What vices have they not excited, says a cele-

brated author [Montaigne], being almost always governed by anger! We pass first to a hatred of the reasons, and then of the persons. We learn to dispute only to contradict; and each contradicting and being contradicted, it comes to pass that the result of the debate is the annihilation of truth. One goes to the east and another to the west—one loses the principle in dispute, and another wanders amidst a crowd of details—and after an hour's storm, they know not what they were discussing. One is above, another below, and another at the side—one seizes on a word or similitude—another neither listens to, nor at all understands what his opponent says, and is so engaged with his own course that he only thinks of following himself, not you.

There are some, again, who, conscious of their weakness, fear everything, refuse everything, confuse the discussion at the onset, or in the midst of it, become obstinate, and are silent, affecting a proud contempt, or a stupid modesty of avoiding contention. One, provided only that he is striking, cares not how he exposes himself—another counts his words and weighs his reasons—a third relies on his voice and lungs alone. We see some who conclude against themselves, and others who weary and bewilder everyone with prefaces and useless digressions. Finally, there are some who arm themselves with abuse, and make a German quarrel in order to finish the dispute with one who has worsted them in argument. These are the common vices of our debates, which are ingeniously enough represented by this writer,* who, without ever having known the true grandeur of man, has sufficiently canvassed his defects.

* The greater part of this page is taken directly from Montaigne, *Essays* iii. 8. His sentiments are here referred to with approbation; and it would have been but fair, since when quoted for condemna-

We may hence judge how liable these kinds of conferences are to disorder the mind, at least unless we take great care not only not to fall ourselves first into these errors, but also not to follow those who do, and so to govern ourselves that we may see them wander without wandering ourselves, and without losing the end we ought to seek, which is the elucidation of the truth under discussion.

VIII.

We find some persons, again, principally amongst those who attend at court, who, knowing very well how inconvenient and disagreeable these controversial dispositions are, adopt an immediately opposite course, which is that of contradicting nothing, but of praising and approving everything indifferently. This is what is called complaisance, which is a disposition convenient enough indeed for our fortune, but very injurious to our judgment, for as the controversial hold as true the contrary of what is said to them, the complaisant appear to take as true everything which is said to them, and this habit corrupts, in the first place, their discourse, and then their minds.

Hence it is that praises are become so common, and are given so indifferently to everyone, that we know not what to conclude from them. There is not a single preacher in the "Gazette," who is not most eloquent, and who does not ravish his hearers by the profundity of his knowledge. All who die are illustrious for piety; and the pettiest authors

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tion he is always mentioned by name, that he should here also have been expressly referred to. The gay and easy scepticism of Montaigne, however, so offended the moral earnestness of the Port-Royal writers, that they can scarcely allow him any merit; and rarely, when referring to him, do him justice.

might make books of praises which they receive from their friends. So that, amidst this profusion of praises, which are made with such little discernment, it is matter of wonder that there are found some so eager for them, and who treasure them so carefully when given.

It is quite impossible that this confusion in the language should not produce some confusion in the mind, for those who adopt the habit of praising everything, become accustomed also to approve of everything. But though the falsehood were only in the words, and not in the mind, this would be sufficient to lead those who sincerely love the truth to avoid it. It is not necessary to reprove everything which may be bad, but it is necessary to praise only what is truly praiseworthy, otherwise we lead those whom we praise in this way into error. We help to deceive those who judge of their persons by these praises; and we commit a wrong against those who truly deserve praises, by giving them equally to those who do not deserve them. Finally, we destroy all the trustworthiness of language, and confuse all ideas and words, by causing them to be no longer signs of our judgments and thoughts, but simply an outward civility which we give to those whom we praise as we might do a bow, for this is all that we can infer from ordinary praises and compliments.

IX.

Amongst the various ways by which self-love plunges men into error, or rather strengthens them in it, and prevents their escape from it, we must not forget one which is without doubt among the principal and most common. This is the engaging to maintain any opinion, to which we may attach ourselves from other considerations than those

of its truth. For this determination to defend our opinion leads us no longer to consider whether the reasons we employ are true or false, but whether they will avail to defend that which we maintain. We employ all sorts of reasons, good or bad, in order that there may be some to suit every one; and we sometimes proceed even to say things which we well know to be absolutely false, if they will contribute to the end which we seek. The following are some examples:—

An intelligent man would hardly ever suspect Montaigne of having believed all the dreams of judicial astrology. Nevertheless, when he needs them for the purpose of foolishly degrading mankind, he employs them as good reasons. "When we consider," says he, "the dominion and power which these bodies have, not only on our lives, and on the state of our fortune, but also on our inclinations, which are governed, driven, and disturbed, according to their influences, how can we deprive them of a soul, of life, and of discourse?"

Would he destroy the advantages which men have over beasts through the intercourse of speech, he relates to us absurd stories, whose extravagance no one knew better than himself, and derives from them these still more absurd conclusions:—"There have been," says he, "some who boasted that they understood the language of brutes, as Appollonious Thyaneous, Melampus, Tiresias, Thales, and others; and since what the cosmographers say is true, that there are some nations which receive a dog as their king, they must give a certain interpretation to his voice and movements." [Essays, ii. 12.]

We might conclude, for the same reason, that when Caligula made his horse consul, the orders which he gave

in the discharge of that office must have been clearly understood. But we should do wrong in accusing Montaigne of this bad consequence; his design was not to speak reasonably, but to gather together a confused mass of everything which might be said against men, which is, however, a vice utterly opposed to the justness of mind and sincerity of a good man.

Who, again, would tolerate this other reasoning of the same author on the subject of the auguries which the pagans made from the flight of birds, and which the wisest amongst them derided? "Amongst all the predictions of time past," says he, "the most ancient, and the most certain, were those which were derived from the flight of birds. We have nothing of the like kind—nothing so admirable; that rule, that order of the moving of the wing, through which the consequences of things to come were obtained, must certainly have been directed by some excellent means to so noble an operation; for it is insufficient to attribute so great an effect to some natural ordinance, without the intelligence, agreement, or discourse of the agent which produces it; and such an opinion is evidently false." [Essays, ii. 12.]

Is it not a delightful thing to see a man who holds that nothing is either evidently true or evidently false, in a treatise expressly designed to establish Pyrrhonism, and to destroy evidence and certainty, deliver to us seriously these dreams as certain truths, and speak of the contrary opinion as evidently false? But he is amusing himself at our expense when he speaks in this way, and he is without excuse in thus sporting with his readers, by telling them things which he does not, and could not without absurdity, believe.

He was, without doubt, as good a philosopher as Virgil, who does not ascribe to any intelligence in the birds even those periodical changes which we observe in their movement according to the difference of the air, from which we may derive some conjecture as to rain and fine weather.

But these mistakes being voluntary, all that is necessary to avoid them is a little good faith. The most common, and the most dangerous, are those of which we are not conscious, because the engagement into which we have entered to defend an opinion disturbs the view of the mind, and leads it to take as true that which contributes to its end. The only remedy which can be applied to these is to have no end but truth, and to examine reasonings with so much care, that even prejudice shall not be able to mislead us.

CHAPTER III.

OF THE FALSE REASONINGS WHICH ARISE FROM OBJECTS THEMSELVES.

We have already noticed that we ought not to separate the inward causes of our errors from those which are derived from objects, which may be called the outward, because the false appearance of these objects would not be capable of leading us into error, if the will did not hurry the mind into forming a precipitate judgment, when it is not as yet sufficiently enlightened.

Since, however, it cannot exert this power over the understanding in things perfectly evident, it is plain that the obscurity of the objects contributes somewhat to our mistakes; and, indeed, there are often cases in which the passion which leads us to reason ill is almost imperceptible. Hence it is useful to consider separately those illusions which arise principally from the things themselves :—

I.

It is a false and impious opinion, that truth is so like to falsehood, and virtue to vice, that it is impossible to distinguish between them; but it is true that, in the majority of cases, there is a mixture of truth and error, of virtue and vice, of perfection and imperfection, and that this mixture is one of the most ordinary sources of the false judgments of men.

For it is through this deceptive mixture that the good qualities of those whom we respect lead us to approve of their errors, and that the defects of those whom we do not esteem lead us to condemn what is good in them, since we do not consider that the most imperfect are not so in everything, and that God leaves in the best imperfections, which, being the remains of human infirmity, ought not to be the objects of our respect or imitation.

The reason of this is, that men rarely consider things in detail ; they judge only according to their strongest impression, and perceive only what strikes them most ; thus, when they perceive a good deal of truth in a discourse, they do not notice the errors which are mixed with it ; and, on the contrary, when the truths are mingled with many errors, they pay attention only to the errors,—the strong bears away the weak, and the most vivid impression effaces that which is more obscure.

It is, however, a manifest injustice to judge in this way. There can be no possible reason for rejecting reason, and truth is not less truth for being mixed with error. It does not belong to men, although men may propound it. Thus, though men, by reason of their errors, may deserve to be condemned, the truth which they advance ought not to be rejected.

Thus justice and truth require, that in all things which are thus made up of good and evil we distinguish between them ; and in this wise separation it is that mental precision mainly appears. Hence the fathers of the church have taken from pagan books very excellent things for their morals, and thus St. Augustine has not scrupled to borrow from a heretical Donatist seven rules for interpreting Scripture.

Reason obliges us, when we can, to make this distinction; but since we have not always time to examine in detail the good and evil that may be in everything, it is right, in such circumstances, to give to them the name which they deserve from their preponderating element. Thus we ought to say that a man is a good philosopher who commonly reasons well, and that a book is a good book which has notoriously more of good than of evil in it.

Men, however, are very much deceived in these general judgments; for they often praise and blame things from the consideration only of what is least important in them,—want of penetration leading them not to discover what is most important, when it is not the most striking: thus, although those who are wise judges in painting value infinitely more design than colour, or delicacy of touch, the ignorant are, nevertheless, more impressed by a painting whose colours are bright and vivid, than by another more sober in colour, however admirable in design.

It must, however, be confessed, that false judgments are not so common in the arts, since those who know nothing about them defer more readily to the opinion of those who are well informed; but they are most frequent in those things which lie within the jurisdiction of the people, and of which the world claims the liberty of judging, such as eloquence.

We call, for example, a preacher eloquent, when his periods are well turned, and when he uses no inelegant words; and from this M. Vaugelas says, in one place, that a bad word does a preacher or an advocate more harm than a bad reasoning. We must believe that this is simply a truth of fact which he relates, and not an opinion which he supports. It is true that we find people who judge in

this way, but it is true also that there is nothing more unreasonable than these judgments; for the purity of language, and the multitude of figures, are but to eloquence what the colouring is to a painting—that is to say, only its lower and more sensuous part; but the most important part consists in conceiving things forcibly, and in expressing them so that we may convey to the minds of the hearers a bright and vivid image, which shall convey these things not only in an abstract form, but with the emotions also with which we conceive them; and this we may find in men of inelegant speech and unbalanced periods, while we meet with it rarely in those who pay so much attention to words and embellishments, since this care distracts their attention from things, and weakens the vigor of their thoughts,—as painters remark, that those who excel in colours do not commonly excel in design—the mind not being capable of this double application, and attention to the one injuring the other.

We may say, in general, that the world values most things by the exterior alone, since we find scarcely any who penetrate to the interior and to the foundation of them; everything is judged according to the fashion, and unhappy are those who are not in favour. Such a one is clever, intelligent, profound, as much as you will, but he does not speak fluently, and cannot turn a compliment well; he may reckon on being little esteemed through the whole of his life by the generality of the world, and on seeing a multitude of insignificant minds preferred before him. It is no great evil not to have the reputation which we merit, but it is a vast one to follow these false judgments, and to judge of things only superficially; and this we are bound, as far as possible, to avoid.

II.

Amongst the causes which lead us into error by a false lustre, which prevents our recognising it, we may justly reckon a certain grand and pompous eloquence, which Cicero calls *abundantem sonantibus verbis uberibusque sententiis;* for it is wonderful how sweetly a false reasoning flows in at the close of a period which well fits the ear, or of a figure which surprises us by its novelty, and in the contemplation of which we are delighted.

These ornaments not only veil from our view the falsehoods which mingle with discourse, but they insensibly engender them, since it often happens that they are necessary to the completion of the period or the figure. Thus, when we hear an orator commencing a long gradation, or an antithesis of many members, we have reason to be on our guard, since it rarely happens that he finishes without exaggerating the truth, in order to accommodate it to the figure. He commonly disposes of it as we do the stones of a building, or the metal of a statue: he cuts it, lengthens it, narrows it, disguises it, as he thinks fit, in order to adapt it to that vain work of words which he wishes to make.

How many false thoughts has the desire of making a good point produced! How many have been led into falsehood for the sake of a rhyme! How many foolish things have certain Italian authors been led to write, through the affectation of using only Ciceronian words, and of what is called pure Latinity! Who could help smiling to hear [Cardinal] Bembo say that a pope had been elected by the favour of the immortal gods—*Deorum immortalium beneficiis?* There are poets even who imagine that the essence of poetry consists in the introduction of pagan divinities; and a German poet, a good versifier enough, though

not a very judicious writer, having been justly reproached by Francis Picus Mirandola with having introduced into a poem, where he describes the wars of Christians against Christians, all the divinities of paganism, and having mixed up Apollo, Diana, and Mercury, with the pope, the electors, and the emperor, distinctly maintained that, without this, it would not have been a poem,—in proof of which he alleged this strange reason, that the poems of Hesoid, of Homer, and of Virgil, are full of the names and the fables of these gods; whence he concluded that he might be allowed to do the same.

These bad reasonings are often imperceptible to those who make them, and deceive them first. They are deafened by the sound of their own words, dazzled with the lustre of their figures; and the grandeur of certain words attaches them unconsciously to thoughts of little solidity, which they would doubtless have rejected had they exercised a little reflection.

It is probable, for instance, that it was the word vestal which pleased an author of our time, and which led him to say to a young lady, to prevent her from being ashamed of knowing Latin, that she need not blush to speak a language which had been spoken by the vestals. For, if he had considered this thought, he would have seen that he might as justly have said to that lady that she ought to blush to speak a language which had been formerly spoken by the courtezans of Rome, who were far more numerous than the vestals; or that she ought to blush to speak any other language than that of her own country, since the ancient vestals spoke only their natural language. All these reasonings, which are worth nothing, are as good as that of this author;

and the truth is, that the vestals have nothing to do with justifying or condemning maidens who learn Latin.

The false reasonings of this kind, which are met with continually in the writings of those who most affect eloquence, show us how necessary it is for the majority of those who write or speak to be thoroughly convinced of this excellent rule,—*that there is nothing beautiful except that which is true;* which would take away from discourse a multitude of vain ornaments and false thoughts. It is true that this precision renders the style more dry and less pompous; but it also renders it clearer, more vigorous, more serious, and more worthy of an honourable man. The impression which it makes is less strong, but much more lasting; whereas that produced by these rounded periods is so transient, that it passes away almost as soon as we have heard them.

III.

It is a very common defect amongst men to judge rashly of the actions and intentions of others; and they almost always fall into it by a bad reasoning, through which, in not recognising with sufficient clearness all the causes which might produce any effect, they attribute that defect definitely to one cause, when it may have been produced by many others; or, again, suppose that a cause, which has accidentally, when united with many circumstances, produced an effect on one occasion, must do so on all occcasions.

A man of learning is found to be of the same opinion with a heretic, in a matter of criticism, independent of religious controversies: a malicious adversary concludes from this that he is favourable to heretics; but he concludes this rashly and maliciously, since it is perhaps reason and truth which have led him to adopt that opinion.

A writer may speak with some strength against an opinion which he believes to be dangerous; he will, from this, be accused of hatred and animosity against the authors who have advanced it; but he will be so unjustly and rashly, since this earnestness may arise from zeal for the truth, just as well as from hatred of the men who oppose it.

A man is the friend of a vicious man: it is, therefore, concluded that he is connected by some bond of interest with him, and is a partaker in his crimes. This does not follow: perhaps he knows nothing about them; and perhaps he has no part in them.

We fail to render true civility to those to whom it is due: we are said to be proud and insolent; but this was perhaps only an inadvertence or simple forgetfulness.

All exterior things are but equivocal signs, that is to say, signs which may signify many things; and we judge rashly when we determine this sign to mean a particular thing, without having any special reason for doing so. Silence is sometimes a sign of modesty and wisdom, and sometimes of stupidity. Slowness sometimes indicates prudence, and sometimes heaviness of mind. Change is sometimes a sign of inconstancy, and sometimes of sincerity. Thus it is bad reasoning to conclude that a man is inconstant, simply from the fact that he has changed his opinion; for he may have a good reason for changing it.

IV.

The false inductions by which general propositions are derived from some particular experiences, constitute one of the most common sources of the false reasonings of men. Three or four examples suffice them to make a *maxim* and a *common-place*, which they then employ as a principle fo deciding all things.

There are many maladies hidden from the most skilful physicians, and remedies often do not succeed: rash minds hence conclude that medicine is absolutely useless, and only a craft of charlatans.

There are light and loose women: this is sufficient for the jealous to conceive unjust suspicions against the most virtuous, and for licentious writers to condemn all universally.

There are some persons who hide great vices under an appearance of piety; libertines conclude from this that all devotion is no better than hypocrisy.

There are some things obscure and hidden, and we are often grossly deceived: all things are obscure and uncertain, say the ancient and modern Pyrrhonists, and we cannot know the truth of anything with certainty.

There is a want of equality in some of the actions of men, and this is enough to constitute a common-place, from which none are exempt. "Reason," say they, "is so weak and blind, that there is nothing so evidently clear as to be clear enough for it; the easy and the hard are both alike to it; all subjects are equal, and nature in general disclaims its jurisdiction. We only think what we *will* in the very moment in which we *will* it; we will nothing freely, nothing absolutely, nothing constantly."

Most people set forth the defects or good qualities of others only by general and extreme propositions. From some particular actions we infer a habit: from three or four faults we conclude a custom; and what happens once a month or once a year, happens every day, at every hour, and every moment, in the discourses of men,—so little pains do they take to observe in them the limits of truth and justice.

V.

It is a weakness and injustice which we often condemn, but which we rarely avoid, to judge of purposes by the event, and to reckon those who had taken a prudent resolution according to the circumstances, so far as they could see them, guilty of all the evil consequences which may have happened therefrom, either simply through accident, or through the malice of others who had thwarted it, or through some other circumstances which it was impossible for them to foresee.

Men not only love to be fortunate as much as to be wise, but they make no distinction between the fortunate and the wise, nor between the unfortunate and the guilty. This distinction is too subtile for them. We are ingenious in finding out the faults which we imagine have produced the want of success; and as astrologers, when they know a given event, fail not to discover the aspect of the stars which produced it, so also we never fail to find, after disgraces and misfortune, that those who have met with them have deserved them by some imprudence. He is unsuccessful, therefore he is in fault. In this way the world reasons, and in this way it has always reasoned, because there has always been little equity in the judgments of men, and because, not knowing the true causes of things, they substitute others according to the event, by praising those who are successful, and blaming those who are not.

VI.

But there are no false reasonings more common amongst men than those into which they fall, either by judging rashly of the truth of things from some authority insuffi-

cient to assure them of it, or by deciding the inward essence by the outward manner. We call the former the sophism of authority, the latter the sophism of the manner.

To understand how common these are, it is only necessary to consider that the majority of men are determined to believe one opinion rather than another, not by any solid and essential reasons which might lead them to know the truth, but by certain exterior and foreign marks which are more consonant to, or which they judge to be consonant to, truth, than to falsehood.

The reason of this is, that the interior truth of things is often deeply hidden; that the minds of men are commonly feeble and dark, full of clouds and false light, while their outward marks of truth are clear and sensible; so that, as men naturally incline to that which is easiest, they almost always range themselves on the side where they see those exterior marks of truth which are readily discovered.

These may be reduced to two principles,—the authority of him who propounds the thing, and the manner in which it is propounded. And these two ways of persuading are so powerful that they carry away almost all minds.

We may derive convincing arguments in matters of religion from the manner in which they are advanced. When we see, for example, in different ages of the church, and principally in the last, men who endeavour to propagate their opinions by bloodshed and the sword; when we see them arm themselves against the church by schism, against temporal powers by revolt; when we see people without the common commission, without miracles, without any external marks of piety, and with the plain marks rather of licentiousness, undertake to change the faith and discipline of the church in so criminal a manner, it is more than suffi-

cient to make reasonable men reject them, and to prevent the most ignorant from listening to them.

But in those things, the knowledge of which is not absolutely necessary, and which God has left more to the discernment of the reason of each one in particular, the authority and the manner are not so important, and they often lead many to form judgments contrary to the truth.

We do not undertake to give here the rules and the precise limits of the respect which is due to authority in human things, we simply indicate some gross faults which are committed in this matter.

We often regard only the number of the witnesses, without at all considering whether the number increases the probability of their having discovered the truth, which is, however, unreasonable; for, as an author of our time has wisely remarked, in difficult things, which each must discover for himself, it is more likely that a single person will discover the truth than that many will. Thus the following is not a valid inference: this opinion is held by the majority of philosophers; it is, therefore, the truest.

We are often persuaded, by certain qualities which have no connection with the truth, of the things which we examine. Thus there are a number of people who trust implicitly to those who are older, and who have had more experience, even in those things which do not depend on age or experience, but on the clearness of the mind.

Piety, wisdom, moderation, are without doubt the most estimable qualities in the world, and they ought to give great authority to those who possess them in those things which depend on piety or sincerity, and even on the knowledge of God, for it is most probable that God communicates more to those who serve him more purely; but there are a

multitude of things which depend only on human intelligence, human experience, and human penetration, and, in these things, those who have the superiority in intellect and in study, deserve to be relied on more than others. The contrary, however, often happens, and many reckon it best to follow, even in these things, the most devout men.

This arises, in part, from the fact that these advantages of mind are not so obvious as the external decorum which appears in pious persons, and in part, also, from the fact that men do not like to make these distinctions. Discrimination perplexes them; they will have all or nothing. If they trust to a man in one thing, they will trust to him in everything; if they do not in one, they will not in any; they love short, plain, and easy ways. But this disposition, though common, is nevertheless contrary to reason, which shows us that the same persons are not to be trusted to in anything, because they are not distinguished in anything; and that it is bad reasoning to conclude: he is a serious man, therefore he is intelligent and clever in everything.

VII.

It is true, indeed, that if any errors are pardonable, those into which we fall through our excessive deference to the opinion of good men are among the number. But there is a delusion much more absurd in itself, but which is nevertheless very common, that, namely, of believing that a man speaks the truth because he is a man of birth, of fortune, or high in office.

Not that any formally make these kinds of reasonings—he has a hundred thousand livres a year; therefore he possesses judgment: he is of high birth; therefore what he advances must be true: he is a poor man; therefore he

is wrong. Nevertheless, something of this kind passes through the minds of the majority, and unconsciously bears away their judgment.

Let the same thing be proposed by a man of quality, and by one of no distinction, and it will often be found that we approve of it in the mouth of the former, when we scarcely condescend to listen to it in that of the latter. Scripture designed to teach us this disposition of men, in that perfect representation which is given of it in the book of Ecclesiasticus.* "When a rich man speaketh, every one holdeth his tongue, and look, what he saith they extol it to the skies; but if the poor man speak, they say, 'What fellow is this?'" *(Dives locutus est, et omnes tacuerunt, et verbum illius usque ad nubes perducent; pauper locutus est, et dicunt, Quis est hic?)*

It is certain that complaisance and flattery have much to do with the approbation which is bestowed on the actions and words of people of quality; as also that they often gain this by a certain outward grace, and by a noble, free, and natural bearing, which is sometimes so distinctive that it is almost impossible for it to be imitated by those who are of low birth. It is certain, also, that there are many who approve of everything which is done and said by the great, through an inward abasement of soul, who bend under the weight of grandeur, and whose sight is not strong enough to bear its lustre; as, indeed, that the outward pomp which environs them always imposes a little, and makes some impression on the strongest minds.

This illusion springs from the corruption of the heart of man, who, having a strong passion for honours and pleasures,

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Ecclesiasticus xiii. 23.

necessarily conceives a great affection for the means by which these honours and pleasures are obtained. The love which we have for all those things which are valued by the world, makes us judge those happy who possess them ; and, in thus judging them happy, we place them above ourselves, and regard them as eminent and exalted persons. This habit of regarding them with respect passes insensibly from their fortune to their mind. Men do not commonly do things by halves : we, therefore, give them minds as exalted as their rank ; we submit to their opinions ; and this is the reason of the credit which they commonly obtain in the affairs which they manage.

But this illusion is still stronger in the great themselves, when they have not laboured to correct the impression which their fortune naturally makes on their minds, than it is in their inferiors. Some derive from their estate and riches a reason for maintaining that their opinions ought to prevail over those who are beneath them. They cannot bear that those people whom they regard with contempt should pretend to have as much judgment and reason as themselves, and this makes them so impatient of the least contradiction. All this springs from the same source, that is, from the false ideas which they have of their grandeur, nobility, and wealth. Instead of considering them as things altogether foreign from their character, which do not prevent them at all from being perfectly equal to all the rest of men, both in mind and body, and which do not prevent their judgment even from being as weak and as liable to be deceived as that of all others, they, in some sort, incorporate with their very essence all these qualities of grand, noble, rich, master, lord, prince,—they exaggerate their idea of themselves with these

things, and never represent themselves to themselves without all their titles, their equipage, and their train.

They are accustomed from their infancy to consider themselves as of a different species from other men ; they never mingle in imagination with the mass of human kind ; they are, in their own eyes, always counts or dukes, and never simply men. Thus they shape to themselves a soul and judgment according to the measure of their fortune, and believe themselves as much above others in mind as they are above them in birth and fortune.

The folly of the human mind is such, that there is nothing which may not serve to aggrandise the idea which it has of itself. A beautiful horse, grand clothes, a long beard, make men consider themselves more clever ; and there are few who do not think more of themselves on horseback or in a coach than on foot. It is easy to convince everybody that there is nothing more ridiculous than these judgments, but it is very difficult to guard entirely against the secret impression which these outward things make upon the mind. All that we can do is to accustom ourselves as much as possible to give no influence at all to those qualities which cannot contribute towards finding the truth, and to give it even to those which do thus contribute only so far as they really contribute to this end. Age, knowledge, study, experience, mind, energy, memory, accuracy, labour, avail to find the truth of hidden things, and these qualities, therefore, deserve to be respected ; but it is always necessary to weigh with care, and then to make a comparison with the opposite reasons ; for from separate individual things we can conclude nothing with certainty, since there are very false opinions which have been sanctioned by men of great mental power, who possessed these qualities to a great extent.

VIII.

There is something still more deceptive in the mistakes which arise from the manner, for we are naturally led to believe that a man is in the right when he speaks with grace, with ease, with gravity, with moderation, and with gentleness; and, on the contrary, that a man is in the wrong when he speaks harshly, or manifests anything of passion, acrimony, or presumption, in his actions and words.

Nevertheless, if we judge of the essence of things by these outward and sensible appearances, we must be often deceived. For there are many people who utter follies gravely and modestly; and others, on the contrary, who, being naturally of a quick temper, or under the influence even of some passion, which appears in their countenance or their words, have nevertheless the truth on their side. There are some men of very moderate capacity, and very superficial, who, from having been nourished at court, where the art of pleasing is studied and practised better than anywhere else, have very agreeable manners, by means of which they render many false judgments acceptable; and there are others, on the contrary, who, having nothing outward to recommend them, have, nevertheless, a great and solid mind within. There are some who speak better than they think, and others who think better than they speak. Thus reason demands of those who are capable of it, that they judge not by these outward things, and hesitate not to yield to the truth, not only when it is proposed in ways that are offensive and disagreeable, but even when it is mingled with much of falsehood; for the same person may speak truly in one thing, and falsely in another; may be right in one thing, and wrong in another.

It is necessary, therefore, to consider each thing separately, that is to say, we must judge of the manner by the manner, and of the matter by the matter, and not of the matter by the manner, nor of the manner by the matter. A man does wrong to speak with anger, and he does right to speak the truth; and, on the contrary, another is right in speaking calmly and civilly, and he is wrong in advancing falsehoods.

But as it is reasonable to be on our guard against concluding that a thing is true or false, because it is proposed in such a way, it is right, also, that those who wish to persuade others of any truth which they have discovered, should study to clothe it in the garb most suitable for making it acceptable, and to avoid those revolting ways of stating it which only lead to its rejection.

They ought to remember that when we seek to move the minds of people, it is a small thing that we have right on our side; and it is a great evil to have only right, and not to have also that which is necessary for making it acceptable.

If they seriously honour the truth, they ought not to dishonour it by covering it with the marks of falsehood and deceit; and if they love it sincerely, they ought not to attach to it the hatred and aversion of men, by the offensive way in which they propound it. It is the most important, as well as the most useful precept of rhetoric, that it behoves us to govern the spirit as well as the words; for although it is a different thing to be wrong in the manner from being wrong in the matter, the faults, nevertheless, of the manner are often greater and more important than those of the matter.

In reality, all these fiery, presumptuous, bitter, obstinate, passionate manners, always spring from some disorder of the mind, which is often more serious than the defect of intelligence and of knowledge, which we reprehend in others. It is, indeed, always unjust to seek to persuade men in this way; for it is very right that we should lead them to the truth when we know it; but it is wrong to compel others to take as true everything that we believe, and to defer to our authority alone. We do this, however, when we propose the truth in this offensive manner. For the way of speaking generally enters into the mind before the reasons, since the mind is more prompt to notice the manner of the speaker than it is to comprehend the solidity of his proofs, which are often, indeed, not comprehended at all. Now the manner of the discourse being thus separated from the proofs, marks only the authority which he who speaks arrogates to himself; so that if he is bitter and imperious, he necessarily revolts the minds of others, since he appears to wish to gain, by authority, and by a kind of tyranny, that which ought only to be obtained by persuasion and reason.

This injustice is still greater when we employ these offensive ways in combating common and received opinions; for the judgment of an individual may indeed be preferred to that of many when it is more correct, but an individual ought never to maintain that his authority should prevail against that of all others.

Thus, not only modesty and prudence, but justice itself, obliges us to assume a modest air when we combat common opinions or established authority, otherwise we cannot escape the injustice of opposing the authority of an individual to an authority either public, or greater and more widely established than our own. We cannot exercise too much modera-

tion when we seek to disturb the position of a received opinion or of an ancient faith. This is so true, that St. Augustine extended it even to religious truths, having given this excellent rule to all those who have to instruct others :—

"Observe," says he, "in what way the wise and religious catholics taught that which they had to communicate to others. If they were things common and authorized, they propounded them in a manner full of assurance, and free from every trace of doubt by being accompanied with the greatest possible gentleness ; but if they were extraordinary things, although they themselves very clearly recognized their truth, they still proposed them rather as *doubts* and as *questions* to be examined, than as dogmas and fixed decisions, in order to accommodate themselves in this to the weakness of those who heard them." And so if a truth be so high that it is above the strength of those to whom it is spoken, they prefer rather to keep it back for a while, in order to give them time for growth, and for becoming capable of receiving it, instead of making it known to them that state of weakness in which it would have overwhelmed them.

LECTURES

OF

SIR WILLIAM HAMILTON

ON

MODIFIED LOGIC.

LECTURES ON LOGIC.

LECTURE I.—MODIFIED LOGIC.

PART I.—MODIFIED STOICHEIOLOGY.

SECTION I.—DOCTRINE OF TRUTH AND ERROR.

TRUTH—ITS CHARACTER AND KINDS.

Modified Logic,—its object

HAVING now terminated the Doctrine of Pure or Abstract Logic, we proceed to that of Modified or Concrete Logic. In entering on this subject, I have to recall to your memory what has formerly been stated in regard to the object which Modified Logic proposes for consideration. Pure Logic takes into account only the necessary conditions of thought, as founded on the nature of the thinking process itself. Modified Logic, on the contrary, considers the conditions to which thought is subject, arising from the empirical circumstances, external and internal, under which exclusively it is the will of our Creator that man should manifest his faculty of thinking. Pure Logic is thus exclusively conversant with the form; Modified Logic is, likewise, occupied with the matter, of thought. And as their objects are different,

so, likewise, must be their ends. The end of Pure Logic is formal truth,—the harmony of thought with thought; the end of Modified Logic is the harmony of thought with existence. Of these ends, that which Pure Logic proposes is less ambitious, but it is fully and certainly accomplished; the end which Modified Logic proposes is higher, but it is far less perfectly attained. The problems which Modified Logic has to solve may be reduced to three: 1°, What is truth and its contradictory opposite,—Error? 2°, What are the Causes of Error, and the Impediments to Truth, by which man is beset in the employment of his faculties, and what are the Means of their Removal? And, 3°, What are the Subsidiaries by which Human Thought may be strengthened and guided in the exercise of its functions?

Its problems,—reduced to three.

From this statement it is evident that Concrete Logic might, like Pure Logic, have been divided into a Stoicheiology and a Methodology,—the former comprising the first two heads,—the latter the third. For if to Modified Stoicheiology we refer the consideration of the nature of concrete truth and error, and of the conditions of a merely not erroneous employment of thought,—this will be exausted in the First and Second Chapters; whereas, if we refer to Methodology a consideration of the means of employing thought not merely without error, but with a certain positive perfection,—this is what the Third Chapter professes to expound.

And distributed between its Stoicheiology and its Methodology.

I commence the First Chapter, which proposes to answer the question,—What is Truth? with its correlatives,—by the dictation of the following paragraphs:

Par. I. Truth and Certainty,—what.

¶ I. The end which all our scientific efforts are exerted to accomplish, is *Truth* and *Certainty*. Truth is the correspondence or agreement of a cognition with its object; its Criterion is the necessity determined by the laws which govern our faculties of knowledge; and Certainty is the consciousness of this necessity. Certainty, or the conscious necessity of knowledge, absolutely excludes the admission of any opposite supposition. Where such appears admissible, doubt and uncertainty arise. If we consider truth by relation to the degree and kind of Certainty, we have to distinguish *Knowledge*, *Belief*, and *Opinion*. Knowledge and Belief differ not only in degree, but in kind. Knowledge is a certainty founded upon insight; Belief is a certainty founded upon feeling. The one is perspicuous and objective; the other is obscure and subjective. Each, however, supposes the other; and an assurance is said to be a knowledge or a belief, according as the one element or the other preponderates. Opinion is the admission of something as true, where, however, neither insight nor feeling is so intense as to necessitate a perfect certainty. What prevents the admission of a proposition as certain is called *Doubt*. The approximation of the imperfect certainty of opinion to the perfect certainty of knowledge or belief is called *Probability*.

If we consider Truth with reference to Knowledge, and to the way in which this knowledge arises, we must distinguish *Empirical* or *a posteriori*, from *Pure* or *a priori Truth*. The former has reference to cognitions which have their source in the presentations of

Perception, External and Internal, and which obtain their form by the elaboration of the Understanding or faculty of Relations (διάνοια). The latter is contained in the necessary and universal cognitions afforded by the Regulative Faculty—Intellect Proper—or Common Sense (νοῦς).

Explication.

This paragraph, after stating that Truth and Certainty constitute the end of all our endeavors after knowledge, for only in the attainment of truth and certainty can we possibly attain to knowledge or science;—I say, after the statement of this manifest proposition,—it proceeds to define what is meant by the two terms *Truth* and *Certainty;* and, to commence with the former,—Truth is defined, the correspondence or agreement of a cognition or cofinitive act of thought with its object.

Truth,—what.

The question—What is truth? is an old and celebrated problem. It was proposed by the Roman Governor—by Pontius Pilate—to our Saviour; and it is a question which still recurs, and is still keenly agitated in the most recent schools of Philosophy. In one respect all are nearly agreed in regard to the definition of the term, for all admit that by truth is understood a harmony,—an agreement, a correspondence between our thought and that which we think about. This definition of truth we owe to the schoolmen. "*Veritas intellectus,*" says Acquinas, "*est adœquatio intellectus et rei, secundum quod intellectus dicit esse, quod est, vel non esse, quod non est.*" From the schoolmen, this definition has been handed down to modern philosophers, by whom it is currently employed, without, in general, a suspicion of its origin. It is not, therefore, in regard to the meaning of the term *truth*, that there is any

Definition of the term.

difference of opinion among philosophers. The questions which have provoked discussion, and which remain, as heretofore, without a definitive solution, are not whether truth be the harmony of thought and reality, but whether this harmony, or truth, be attainable, and whether we possess any criterion by which we can be assured of its attainment. Considering, however, at present only the meaning of the term, philosophers have divided the Truth (or the harmony of thought and its object) into different species, to which they have given diverse names; but they are at one neither in the division nor in the nomenclature.

Questions in debate regarding Truth.

It is plain that for man there can only be conceived two kinds of truth, because there are for human thought only two species of object. For that about which we think must either be a thought, or something which a thought contains. On this is founded the distinction of Formal Knowledge and Real Knowledge,—of Formal Truth and Real Truth. Of these in their order:

For man only two kinds of Truth,—Formal and Real.

I. In regard to the former, a thought abstracted from what it contains, that is, from its matter or what it is conversant about, is the more form of thought. The knowledge of the form of thought is a formal knowledge, and the harmony of thought with the form of thought is, consequently, Formal Truth. Now Formal Knowledge is of two kinds; for it regards either the conditions of the Elaborative Faculty,—the Faculty of Thought Proper,—or the conditions of our Presentations or Representations of external things, that is, the intuitions of Space and Time. The former of these sciences is Pure

I. Formal Truth.

Formal Truth of two kinds,—Logical and Mathematical.

Logic—the science which considers the laws to which the Understanding is astricted in its elaborative operations, without enquiring what is the object,—what is the matter, to which these operations are applied. The latter of these sciences is Mathematics, or the science of Quantity, which considers the relations of Time and Space, without enquiring whether there be any actual reality in space or time. Formal truth will, therefore, be of two kinds,—Logical and Mathematical. Logical truth is the harmony or agreement of our thoughts with themselves as thoughts, in other words, the correspondence of thought with the universal laws of thinking. These laws are the object of Pure or General Logic, and in these it places the criterion of truth. This criterion is, however, only the negative condition—only the *conditio sine qua non*, of truth. Logical truth is supposed in supposing the possibility of thought; for all thought presents a combination, the elements of which are repugnant or congruent, but which cannot be repugnant and congruent at the same time. Logic might be true, although we possessed no truth beyond its fundamental laws; although we knew nothing of any real existence beyond the formal hypothesis of its possibility.

Logical Truth.

But were the Laws of Logic purely subjective, that is, were they true only for our thought alone, and without any objective validity, all human sciences (and Mathematics among the rest) would be purely subjective likewise; for we are cognizant of objects only under the forms and rules of which Logic is the scientific development. If the true character of objective validity be universality, the Laws of Logic are really of that character, for these laws constrain

us, by their own authority, to regard them as the universal laws not only of human thought, but of universal reason.

Mathematical Truth.

The case is the same with the other formal science, the science of Quantity, or Mathematics. Without inquiring into the reality of existences, and without borrowing from, or attributing to, them anything, Arithmetic, the science of Discrete Quantity, creates its numbers, and Geometry, the science of Continuous Quantity, creates its figures; and both operate upon these their objects in absolute independence of all external actuality. The two mathematical sciences are dependent for their several objects only on the notion of time and the notion of space,—notions under which alone matter can be conceived as possible, for all matter supposes space, and all matter is moved in space and time. But to the notions of space and time the existence or non-existence of matter is indifferent; indifferent, consequently, to Geometry and Arithmetic, so long at least as they remain in the lofty regions of pure speculation, and do not descend to the practical application of their principles. If matter had no existence, nay, if space and time existed only in our minds, mathematics would still be true; but their truth would be of a purely formal and ideal character,—would furnish us with no knowledge of objective realities.

So much for Formal Truth, under its two species of Logical and Mathematical.

II. Real Truth.

Real and Formal Sciences.

The other genus of truth—(the end which the Real Sciences propose)—is the harmony between a thought and its matter. The Real Sciences are those which have a determinate reality for their object, and which are conversant about existences other than the forms of thought.

The Formal Sciences have a superior certainty to the real; for they are simply ideal combinations, and they construct their objects without inquiring about their objective reality. The real sciences are sciences of fact, for the point from which they depart is always a fact,—always a presentation. Some of these rest on the presentations of Self-consciousness, or the facts of mind; others on the presentations of Sensitive Perception, or the facts of nature. The former are the Mental Sciences, the latter the Material. The facts of mind are given partly as contingent, partly as necessary; the latter—the necessary facts—are universal virtually and in themselves; the former—the contingent facts—only obtain a fictitious universality by a process of generalization. The facts of nature, however necessary in themselves, are given to us only as contingent and isolated phænomena; they have, therefore, only that conditional, that empirical, generality, which we bestow on them by classification.

Under the Real Sciences are included the Mental and Material.

Real truth is, therefore, the correspondence of our thoughts with the existences which constitute their objects. But here a difficulty arises:—How can we know that there is, that there can be, such a correspondence? All that we know of the objects is through the presentations of our faculties; but whether these present the objects as they are in themselves, we can never ascertain, for to do this it would be requisite to go out of ourselves,—out of our faculties,—to obtain a knowledge of the objects by other faculties, and thus to compare our old presentations with our new. But all this, even were the supposition possible, would be incompetent to

How can we know that there is a correspondence between our thought and its object?

afford us the certainty required. For were it possible to leave our old, and to obtain a new, set of faculties, by which to test the old, still the veracity of these new faculties would be equally obnoxious to doubt as the veracity of the old. For what guarantee could we obtain for the credibility in the one case, which we do not already possess in the other? The new faculties could only assert their own truth; but this is done by the old; and it is impossible to imagine any presentations of the non-ego by any finite intelligence, to which a doubt might not be raised; whether these presentations were not merely subjective modifications of the conscious ego itself. All that could be said in answer to such a doubt is, that if such were true, our whole nature is a lie,—a supposition which is not, without the strongest evidence, to be admitted; and the argument is as competent against the sceptic in our present condition, as it would be were we endowed with any other conceivable form of Acquisitive and Cognitive Faculties. But I am here trenching on what ought to be reserved for an explanation of the Criterion of Truth.

Real Truth,—its subdivisions.

Such, as it appears to me, is the only rational division of Truth according to the different character of the objects to which thought is relative, —into Formal and into Real Truth. Formal Truth, as we have seen, is subdivided into Logical and into Mathematical. Real Truth might likewise be subdivided, were this requisite, into various species. For example, Metaphysical Truth might denote the harmony of thought with the necessary facts of mind; Psychological Truth, the harmony of thought with the contingent facts of mind; and Physical Truth, the harmony of thought with the phænomena of external experience.

Metaphysical.
Psychological.
Physical.

Various applications of the term *Truth*.

It now remains to say a word in regard to the confusion which has been introduced into this subject, by the groundless distinctions and contradictions of philosophers. Some have absurdly given the name of *truth* to the mere reality of existence, altogether abstracted from any conception or judgment relative to it, in any intelligence, human or divine. In this sense *physical truth* has been used to denote the actual existence of a thing. Some have given the name of *metaphysical truth* to the congruence of the thing with its idea in the mind of the Creator. Others again have bestowed the name of *metaphysical truth* on the mere logical possibility of being thought; while they have denominated by *logical truth* the metaphysical or physical correspondence of thought with its objects. Finally, the term *moral* or *ethical truth* has been given to veracity, or the correspondence of thought with its expression. In this last case, truth is not, as in the others, employed in relation to thought and its object, but to thought and its enouncement. So much for the notion, and the principal distinctions of Truth.

The Criterion of Truth.

But, returning to the paragraph; I take the next clause, which is,—"The Criterion of truth is the necessity determined by the laws which govern our faculties of knowledge; and the consciousness of this necessity is certainty." That the necessity of a cognition, that is, the impossibility of thinking it other than as it is presented,—that this necessity, as founded on the laws of thought, is the criterion of truth, is shown by the circumstance that where such necessity is found, all doubt in regard to the correspondence of the cognitive thought and its object must vanish; for to doubt

whether what we necessarily think in a certain manner, actually exists as we conceive it, is nothing less than an endeavor to think the necessary as the not necessary or the impossible, which is contradictory.

What has just been said also illustrates the truth of the next sentence of the paragraph, viz.,—"Certainty or the conscious necessity of a cognition absolutely excludes the admission of any opposite supposition. When such is found to be admissible, doubt and uncertainty arise." This sentence requiring no explanation, I proceed to the next, viz., —"If we consider truth by the relation to the degree and kind of Certainty, we have to distinguish Knowledge, Belief, and Opinion. Knowledge and Belief differ not only in degree but in kind. Knowledge is a certainty founded on intuition. Belief is a certainty founded upon feeling. The one is perspicuous and objective, the other is obscure and subjective. Each, however, supposes the other, and an assurance is said to be a knowledge or a belief, according as the one element or the other preponderates."

In reference to this passage, it is necessary to say something in regard to the difference of Knowledge and Belief. In common language the word *Belief* is often used to denote an inferior degree of certainty. We may, however, be equally certain of what we believe as of what we know, and it has, not without ground, been maintained by many philosophers, both in ancient and in modern times, that the certainty of all knowledge is, in its ultimate analysis, resolved into a certainty of belief. "All things," says Luther, "stand in a belief, in a faith, which he can neither see nor comprehend. The

Knowledge and Belief—their difference.

That the certainty of all knowledge is ultimately resolvable into a certainty of Belief, maintained by Luther.

man who would make these visible, manifest, and comprehensible, has vexation and heart-grief for his reward. May the Lord increase Belief in you and in others." But you may perhaps think that the saying of Luther is to be taken theologically, and that, philosophically considered, all belief ought to be founded on knowledge, not all knowledge in belief. But the same doctrine is held even by those philosophers who are the least disposed to mysticism or blind faith. Among these Aristotle stands distinguished. He defines science, strictly so called, or the knowledge of indubitable truths, merely by the intensity of our conviction or subjective assurance; and on a primary and incomprehensible belief he hangs the whole chain of our comprehensible or immediate knowledge. The doctrine which has been called *The Philosophy of Common Sense*, is the doctrine which founds all our knowledge on belief; and, though this has not been signalized, the doctrine of Common Sense is perhaps better stated by the Stagirite than by any succeeding thinker. "What," he says, "appears to all men, that we affirm to be, and he who rejects this belief (πίστις) will assuredly advance nothing better worthy of credit." This passage is from his *Nicomachean Ethics*. But, in his Physical Treatises, he founds in belief the knowledge we have of the reality of motion, and by this, as a source of knowledge paramount to the Understanding, he supersedes the contradictions which are involved in our conception of motion, and which had so acutely been evolved by the Eleatic Zeno, in order to show that motion was impossible. In like manner, in his Logical Treatises, Aristotle shows that the primary or ultimate principles of knowledge must be incomprehensible; for if comprehensible, they must be comprehended in some higher

Aristotle.

notion, and this again, if not itself incomprehensible, must be again comprehended in a still higher, and so on in a progress *ad infinitum*, which is absurd. But what is given as an ultimate and incomprehensible principle of knowledge, is given as a fact, the existence of which we must admit, but the reasons of whose existence we cannot know,—we cannot understand. But such an admission, as it is not a knowledge, must be a belief; and thus it is that, according to Aristotle, all our knowledge is in its root a blind, a passive faith, in other words, a feeling. The same doctrine was subsequently held by many of the acutest thinkers of ancient times, more especially among the Platonists; and of these Proclus is perhaps the philosopher in whose works the doctrine is turned to the best account. In modern times we may trace it in silent operation, though not explicitly proclaimed, or placed as the foundation of a system. It is found spontaneously recognized even by those who might be supposed the least likely to acknowledge it without compulsion. Hume, for example, against whose philosophy the doctrine of Common Sense was systematically arrayed, himself pointed out the weapons by which his adversaries subsequently assailed his scepticism; for he himself was possessed of too much philosophical acuteness not to perceive that the root of knowledge is belief. Thus, in his *Inquiry*, he says,—"It seems evident that men are carried by a natural instinct or prepossession to repose faith in their senses: and that, without any reasoning, or even almost before the use of reason, we always suppose an external universe which depends not on our perception, but would exist though we and every sensible creature were absent or annihilated. Even the animal

The Platonists. Proclus.

Hume.

creation are governed by a like opinion, and preserve this belief,—the belief of external objects, in all their thoughts, designs, and actions. . . . . This very table which we see white, and which we feel hard, is believed to exist independent of our perception, and to be something external to our mind which perceives it."

The manifestation of Belief involves Knowledge.

But, on the other hand, the manifestation of this belief necessarily involves knowledge; for we cannot believe without some consciousness or knowledge of the belief, and, consequently, without some consciousnesss or knowledge of the object of the belief. Now the immediate consciousness or knowledge of an object is called an *intuition*,—an *insight*. It is thus impossible to separate belief and knowledge,—feeling and intuition. They each suppose the other.

Intuition,—what.

The question as to the relation of Belief and Knowledge properly metaphysical.

The consideration, however, of the relation of Belief and Knowledge does not properly belong to Logic, except in so far as it is necessary to explain the nature of Truth and Error. It is altogether a metaphysical discussion; and one of the most difficult problems of which Metaphysics attempts the solution.

The remainder of the paragraph contains the statement of certain distinctions and the definition of certain terms, which it was necessary to signalize, but which do not require any commentary for their illustration. The only part that might have required an explanation is the distinction of Truth into Pure, or *a priori*, and into Empirical, or *a posteriori*. The explanation of this division has been already given more than once, but the following may now be added.

Pure and Empirical Truth.

Experience presents to us only individual objects, and as these individual objects might or might not have come within our sphere of observation, our whole knowledge of and from these objects might or might not exist;—it is merely accidental or contingent. But as our knowledge of individual objects affords the possibility, as supplying the whole contents, of our generalized or abstracted notions, our generalized or abstracted notions are, consequently, not more necessary to thought, than the particular observations out of which they are constructed. For example, every horse I have seen I might not have seen; and I feel no more necessity to think the reality of a horse than the reality of a hippogriff; I can, therefore, easily annihilate in thought the existence of the whole species. I can suppose it not to be,—not to have been. The case is the same with every other notion which is mediately or immediately the datum of observation. We can think away each and every part of the knowledge we have derived from experience; our whole empirical knowledge is, therefore, a merely accidental possession of the mind.

But there are notions in the mind of a very different character,—notions which we cannot but think, if we think at all. These, therefore, are notions necessary to the mind; and, as necessary, they cannot be the product of experience. For example, I perceive something to begin to be. I feel no necessity to think that this thing must be at all, but thinking it existent, I cannot but think that it has a cause. The notion, or rather the judgment, of Cause and Effect, is, therefore, necessary to the mind. If so, it cannot be derived from experience.

LECTURE II.—MODIFIED STOICHEIOLOGY.

SECTION I.—DOCTRINE OF TRUTH AND ERROR.

SECTION II.—ERROR,—ITS CAUSES AND REMEDIES.

A.—GENERAL CIRCUMSTANCES—SOCIETY.

I now proceed to the consideration of the opposite of Truth,—Error, and, on this subject, give you the following paragraph:

¶ II. Error is opposed to Truth; and Error arises, 1°, From the commutation of what is Subjective and what is Objective in thought; 2°, From the Contradiction of a supposed knowledge with its Laws; or, 3°, From a want of Adequate Activity in our Cognitive Faculties.

Par. II. Error,—its character and sources.

Error is to be discriminated from *Ignorance* and from *Illusion;* these, however, along with Arbitrary Assumption, afford the most frequent occasions of error.

This paragraph consists of two parts, and these I shall successively consider. The first is: "Error is opposed to truth; and Error arises,—1°, From the commutation of what is subjective with what is objective in thought; 2°, From the contradiction of a

Explication.

supposed knowledge with its laws; or, 3°, From a want of adequate activity in our cognitive faculties."

Error,—what.

"In the first place, we have seen that Truth is the agreement of a thought with its object. Now, as Error is the opposite of truth,—Error must necessarily consist in a want of this agreement. In the second place, it has been shown that the criterion or standard of truth is the necessity founded on the laws of our cognitive faculties; and from this it follows that the essential character of error must be, either that it is not founded on these laws, or that it is repugnant to them. But these two alternatives may be viewed as only one; for inasmuch as, in the former case, the judgment remains undecided, and can make no pretence to certainty, it may be thrown out of account no less than in the latter, where, as positively contradictory of the laws of knowledge, it is necessarily false. Of these statements the first, that is, the non-agreement of a notion with its object, is error viewed on its material side; and as a notion is the common product,—the joint result afforded by the reciprocal action of object and subject, it is evident that whatever the notion contains not correspondent to the object, must be a contribution by the thinking subject alone, and we are thus warranted in saying that Material Error consists in the commuting of what is subjective with what is objective in thought; in other words, in mistaking an ideal illusion for a real representation. The second of these statements, that is, the incongruence of the supposed cognition with the laws of knowledge, is error viewed on its formal side. Now here the question at once presents itself,—How can an act of

As Material.

As Formal.

cognition contradict its own laws? The answer is that it cannot; and error, when more closely scrutinized, is found not so much to consist in the contradictory activity of our cognitive faculties as in their want of activity. And this may be in consequence of one or other of two causes. For it may arise from some other mental power,—the will, for example, superseding,—taking the place of, the defective cognition, or, by its intenser force, turning it aside and leading it to a false result; or it may arise from some want of relative perfection in the object, so that the cognitive faculty is not determined by it to the requisite degree of action.

Arises from the want of adequate activity of the Cognitive Faculties.

"What is actually thought, cannot but be correctly thought. Error first commences when thinking is remitted, and can in fact only gain admission in virtue of the truth which it contains;—every error is a perverted truth. Hence Descartes is justified in the establishment of the principle,—that we would never admit the false for the true, if we would only give assent to what we clearly and distinctly apprehend. '*Nihil nos unquam falsum pro vero admissuros, si tantum iis assensum præbeamus, quæ clare et distincte percipimus.*'" In this view the saying of the Roman poet—

"*Nam neque decipitur ratio, nec decipit unquam,*"

—is no longer a paradox; for the condition of error is not the activity of intelligence, but its inactivity.

So much for the first part of the paragraph. The second is—"Error is to be discriminated from Ignorance and from Illusion, which, however, along with Arbitrary Assumption, afford the usual occasions of Error."

Error discriminated from Ignorance and Illusion.

"Ignorance is a mere negation,—a mere not-knowledge; whereas in error there lies a positive pretence to knowledge. Hence a representation, be it imperfect, be it even without any correspondent objective reality, is not in itself an error. The imagination of a hippogriff is not in itself false; the Orlando Furioso is not a tissue of errors. Error only arises when we attribute to the creations of our minds some real object, by an assertory judgment; we do not err and deceive either ourselves or others, when we hold and enounce a subjective or problematic supposition only for what it is. Ignorance,—not knowledge,—however, leads to error, when we either regard the unknown as non-existent, or when we falsely fill it up. The latter is, however, as much the result of Will, of arbitrary assumption, as of ignorance; and, frequently, it is the result of both together. In general, the will has no inconsiderable share in the activity by which knowledge is realized. The will has not immediately an influence on our judgment, but mediately it has. Attention is an act of volition, and attention furnishes to the understanding the elements of its decision. The will determines whether we shall carry on our investigations, or break them off, content with the first apparent probability; and whether we shall apply our observations to all, or, only partially, to certain, momenta of determination.

Ignorance.

"The occasions of Error which lie in those qualities of Presentation, Representation, and Thought arising from the conditions and influences of the thinking subject itself, are called *Illusions*. But the existence of illusion does not necessarily imply the existence of error. Illusion becomes error only when we attribute to it objective truth; whereas illusion is no error when we

Illusion.

regard the fallacious appearance as a mere subjective affection. In the jaundice, we see everything tinged with yellow, in consequence of the suffusion of the eye with bile. In this case, the yellow vision is illusion; and it would become error, were we to suppose that the objects we perceive were really so colored. All the powers which cooperate to the formation of our judgments may become the sources of illusion, and, consequently, the occasions of error. The Senses, the Presentative Faculties, External and Internal, the Representative, the Retentive, the Reproductive, and the Elaborative Faculties, are immediate, the Feelings and the Desires are mediate, sources of illusion. To these must be added the Faculty of Signs, in all its actual manifestations in language. Hence we speak of sensible, psychological, moral, and symbolical, illusion. In all these relations the causes of illusion are partly general, partly particular; and though they proximately manifest themselves in some one or other of these forms, they may ultimately be found contained in the circumstances by which the mental character of the individual is conformed. Taking, therefore, a general view of all the possible Sources of Error, I think they may be reduced to the following classes, which, as they constitute the heads and determine the order of the ensuing discussion, I shall comprise in the following paragraph, with which commences the consideration of the Second Chapter of Modified Logic. Before, however, proceeding to consider these several classes in their order, I may observe that Bacon is the first philosopher who attempted a systematic enumeration of the various sources of error; and his quaint classification of these, under the significant name of *idols*, into the

Its sources.

Bacon's classification of the sources of error.

four genera of Idols of the Tribe (*idola tribus*), Idols of the Den (*idola specus*), Idols of the Forum (*idola fori*), which may mean either the market-place, the bar, or the place of public assembly, and Idols of the Theatre (*idola theatri*), he thus briefly characterizes.

¶ III. The Causes and Occasions of Error are comprehended in one or other of the four following classes. For they are found either, 1°, In the General Circumstances which modify the intellectual character of the individual; or, 2°, In the Constitution, Habits, and Reciprocal Relations of his powers of Cognition, Feeling, and Desire; or, 3°, In the Language which he employs, as an Instrument of Thought and a Medium of Communication: or, 4°, In the nature of the Objects themselves, about which his knowledge is conversant.

Par. III. Error,—its sources.

¶ IV. Under the General Circumstances which modify the character of the individual are comprehended, 1°, The particular degree of Cultivation to which his nation has attained; for its rudeness, the partiality of its civilization, and its over-refinement are all manifold occasions of error; and this cultivation is expressed not merely in the state of the arts and sciences, but in the degree of its religious, political, and social advancement; 2°, The Stricter Associations, in so far as these tend to limit the freedom of thought, and to give it a one-sided direction; such are Schools, Sects, Orders, Exclusive Societies, Corporations, Castes, etc.

Par. IV. I. General Circumstances which modify the character of the individual.

In the commencement of the Course, I had occasion to

allude to the tendency there is in man to assimilate in opinions and habits of thought to those with whom he lives. Man is by nature, not merely by accidental necessity, a social being. For only in society does he find the conditions which his different faculties require for their due development and application. But society, in all its forms and degrees, from a family to a State, is only possible under the condition of a certain harmony of sentiment among its members; and as man is by nature destined to a social existence, he is by nature determined to that analogy of thought and feeling which society supposes, and out of which society springs. There is thus in every association, great and small, a certain gravitation of opinions towards a common centre. As in our natural body every part has a necessary sympathy with every other, and all together form, by their harmonious conspiration, a healthy whole; so, in the social body, there is always a strong predisposition in each of its members to act and think in unison with the rest. This universal sympathy or fellow-feeling is the principle of the different spirit dominant in different ages, countries, ranks, sexes, and periods of life. It is the cause why fashions, why political and religious enthusiasm, why moral example either for good or evil, spread so rapidly and exert so powerful an influence. As men are naturally prone to imitate others, they, consequently, regard as important or insignificant, as honorable or disgraceful, as true or false, as good or bad, what those around them consider in the same light.

Explication. Man by nature social, and influenced by the opinions of his fellows.

Of the various testimonies I formerly quoted, of the strong assimilating influence of man on man, and of the power of custom, to make that appear true, natural, and necessary,

Pascal quoted on the power of custom.

which in reality is false, unnatural, and only accidentally suitable, I shall only adduce that of Pascal. "In the just and the unjust," says he, "we find hardly anything which does not change its character in changing its climate. Three degrees of an elevation of the pole reverses the whole of jurisprudence. A meridian is decisive of truth, and a few years, of possession. Fundamental laws change. Right has its epochs. A pleasant justice which a river or a mountain limits! Truth on this side the Pyrenees, error on the other!" It is the remark of an ingenious philosopher, "that if we take a survey of the universe, all nations will be found admiring only the reflection of their own qualities, and contemning in others whatever is contrary to what they are accustomed to meet with among themselves. Here is the Englishman accusing the French of frivolity; and here the Frenchman reproaching the Englishman with selfishness and brutality. Here is the Arab persuaded of the infallibility of his Caliph, and deriding the Tartar who believes in the immortality of the Grand Lama. In every nation we find the same congratulation of their own wisdom, and the same contempt of that of their neighbors.

"Were there a sage sent down to earth from heaven, who regulated his conduct by the dictates of pure reason alone, this sage would be universally regarded as a fool. He would be, as Socrates says, like a physician accused by the pastry-cooks, before a tribunal of children, of prohibiting the eating of tarts and cheese-cakes; a crime undoubtedly of the highest magnitude in the eyes of his judges. In vain would this sage support his opinions by the clearest arguments,—the most irrefragable demonstrations; the whole world would be for him like the nation of hunch-

backs, among whom, as the Indian fabulists relate, there once upon a time appeared a god, young, beautiful, and of consummate symmetry. This god, they add, entered the capital; he was there forthwith surrounded by a crowd of natives; his figure appeared to them extraordinary; laughter, hooting, and taunts manifested their astonishment, and they were about to carry their outrages still further, had not one of the inhabitants (who had undoubtedly seen other men), in order to snatch him from the danger, suddenly cried out—'My friends! my friends! What are we going to do? Let us not insult this miserable monstrosity. If heaven has bestowed on us the general gift of beauty,—if it has adorned our backs with a mount of flesh, let us with pious gratitude repair to the temple and render our acknowledgement to the immortal gods.'" This fable is the history of human vanity. Every nation admires its own defects, and contemns the opposite qualities in its neighbors. To succeed in a country, one must be a bearer of the national hump of the people among whom he sojourns.

The art of doubting well difficult to teach and to learn.

There are few philosophers who undertake to make their countrymen aware of the ridiculous figure they cut in the eye of reason; and still fewer the nations who are able to profit by the advice. All are so punctiliously attached to the interests of their vanity, that none obtain in any country the name of wise, except those who are fools of the common folly. There is no opinion too absurd not to find nations ready to believe it, and individuals prompt to be its executioners or its martyrs. Hence it is that the philosopher declared, that if he held all truths shut up within his hand, he would take especial care not to show

them to his fellow-men. In fact, if the discovery of a single truth dragged Galileo to the prison, to what punishment would he not be doomed who should discover all? Among those who now ridicule the folly of the human intellect, and are indignant at the persecution of Galileo, there are few who would not, in the age of that philosopher, have clamored for his death. They would then have been imbued with different opinions; and opinions not more passively adopted than those which they at present vaunt as liberal and enlightened. To learn to doubt of our opinions, it is sufficient to examine the powers of the human intellect, to survey the circumstances by which it is affected, and to study the history of human follies. Yet in modern Europe six centuries elapsed from the foundation of Universities until the appearance of that extraordinary man,—I mean Descartes,—whom his age first persecuted, and then almost worshipped as a demi-god, for initiating men in the art of doubting,—of doubting well,—a lesson at which, however, both their skepticism and credulity show that, after two centuries, they are still but awkward scholars. Socrates was wont to say,—"All that I know is that I know nothing." In our age it would seem that men know everything except what Socrates knew. Our errors would not be so frequent were we less ignorant; and our ignorance more curable, did we not believe ourselves to be all-wise.

Thus it is that the influence of Society, both in its general form of a State or Nation, and in its particular forms of Schools, Sects, etc., determines a multitude of opinions in its members, which, as they are passively received, so they are often altogether erroneous.

Among the more general and influential of these there are two, which, though apparently contrary, are, however, both, in reality, founded on the same incapacity of independent thought, —on the same influence of example—I mean the excessive admiration of the Old, and the excessive admiration of the New. The former of these prejudices—under which may be reduced the prejudice in favor of Authority,—was at one time prevalent to an extent of which it is difficult for us to form a conception. This prejudice is prepared by the very education not only which we do, but which we all must receive. The child necessarily learns everything at first on credit,—he believes upon authority. But when the rule of authority is once established, the habit of passive acquiescence and belief is formed, and, once formed, it is not again always easily thrown off. When the child has grown up to an age in which he might employ his own reason, he has acquired a large stock of ideas; but who can calculate the number of errors which this stock contains? and by what means is he able to discriminate the true from the false? His mind has been formed to obedience and uninquiry; he possesses no criterion by which to judge; it is painful to suspect what has been long venerated, and it is felt even as a kind of personal mutilation to tear up what has become irradicated in his intellectual and moral being. *Ponere difficile est quæ placuere diu.* The adult does not, therefore, often judge for himself more than the child; and the tyranny of authority and foregone opinion continues to exert a sway during the whole course of his life. In our infancy and childhood the credit accorded to our parents and instructors is implicit;

Two general forms of the influence of example.

1. Prejudice in favor of the Old.

Prepared by Education.

and if what we have learned from them be confirmed by what we hear from others, the opinions thus recommended become at length stamped in almost indelible characters upon the mind. This is the cause why men so rarely abandon the opinions which vulgarly pass current; and why what comes as new is by so many, for its very novelty, rejected as false. And hence it is, as already noticed, that truth is as it were geographically and politically distributed; what is truth on one side of a boundary being error and absurdity on the other. What has now been said of the influence of society at large, is true also of the lesser societies which it contains, all of which impose with a stronger or feebler, a wider or more contracted, authority, certain received opinions upon the faith of the members. Hence it is that whatever has once obtained a recognition in any society, large or small, is not rejected when the reasons on which it was originally admitted have been proved erroneous. It continues, even for the reason that it is old and has been accepted, to be accepted still; and the title which was originally defective, becomes valid by continuance and prescription.

2. Prejudice in favor of the New.

But opposed to this cause of error, from the prejudice in favor of the Old, there is the other, directly the reverse,—the prejudice in favor of the New. This prejudice may be, in part at least, the result of sympathy and fellow-feeling. This is the cause why new opinions, however erroneous, if they once obtain a certain number of converts, often spread with a rapidity and to an extent, which, after their futility has been ultimately shown, can only be explained on the principle of a kind of intellectual contagion. But the principal cause of the prejudice in favor of novelty lies in the Passions,

and the consideration of these does not belong to the class of causes with which we are at present occupied.

Prejudice of Learned Authority.

Connected with and composed of both these prejudices,—that in favor of the old and that in favor of the new,—there is the prejudice of Learned Authority; for this is usually associated with the prejudices of Schools and Sects. As often as men have appeared, who, by the force of their genius, have opened up new views of science, and thus contributed to the progress of human intellect, so often have they, likewise, afforded the occasion of checking its advancement, and of turning it from the straight path of improvement. Not that this result is to be imputed as a reproach to them, but simply because it is of the nature of man to be so affected. The views which influenced these men of genius, and which, consequently, lie at the foundation of their works, are rarely comprehended in their totality by those who have the names of these authors most frequently in their mouths. The many do not concern themselves to seize the ideal which a philosopher contemplated, and of which his actual works are only the imperfect representations; they appropriate to themselves only some of his detached apothegms and propositions, and of these compound, as they best can, a sort of system suited to their understanding, and which they employ as a talisman in their controversies with others. As their reason is thus a captive to authority, and, therefore, unable to exert its native freedom, they, consequently, catch up the true and the false without discrimination, and remain always at the point of progress where they had been placed by their leaders. In their hands a system of living truths becomes a

mere petrified organism; and they require that the whole science shall become as dead and as cold as their own idol. Such was Plato's doctrine in the hands of the Platonists; such was Aristotle's philosophy in the hands of the Schoolmen; and the history of modern systems affords equally the same result.

So much for the first genus into which the Sources of Error are divided.

LECTURE III.—MODIFIED STOICHEIOLOGY.

SECTION II.—ERROR—ITS CAUSES AND REMEDIES.

A.—GENERAL CIRCUMSTANCES—SOCIETY.

B.—AS IN POWERS OF COGNITION, FEELING, AND DESIRE.

I.—AFFECTIONS—PRECIPITANCY—SLOTH—HOPE AND FEAR—SELF-LOVE.

Recapitulation.

In our last Lecture, we entered on the consideration of the various sources of Error. These, I stated, may be conveniently reduced to four heads, and consist, 1°, In the General Circumstances which modify the intellectual character of the individual; 2°, In the Constitution, Habits, and Reciprocal Relations of his powers of Cognition, Feeling, and Desire; 3°, In the language which he employs as an Instrument of Thought and a Medium of Communication; and, 4°, In the nature of the Objects themselves about which his knowledge is conversant.

Of these, I then gave you a general view of the nature of those occasions of Error, which originate in the circumstances under the influence of which the character and opinions of man are determined for him as a member of society. Under this head I stated, that, as man is destined by his Creator to fulfil the end of his existence in society, he is wisely furnished with a disposition to imitate those

among whom his lot is cast, and thus conform himself to whatever section of human society he may by birth belong, or of which he may afterwards become a member. The education we receive, nay the very possibility of receiving education at all, supposes to a certain extent the passive infusion of foreign and traditionary opinions. For as man is compelled to think much earlier than he is able to think for himself,—all education necessarily imposes on him many opinions which, whether in themselves true or false, are, in reference to the recipient, only prejudices; and it is even only a small number of mankind who at a later period are able to bring these obtruded opinions to the test of reason, and by a free exercise of their own intelligence to reject them if found false, or to acknowledge them if proved true.

But while the mass of mankind thus remain, during their whole lives, only the creatures of the accidental circumstances which have concurred to form for them their habits and beliefs; the few who are at last able to form opinions for themselves, are still dependent, in a great measure, on the unreasoning judgment of the many. Public opinion, hereditary custom, despotically impose on us the capricious laws of propriety and manners. The individual may possibly, in matters of science, emancipate himself from their servitude; in the affairs of life he must quietly submit himself to the yoke. The only freedom he can here prudently manifest, is to resign himself with a consciousness that he is a slave not to reason but to conventional accident. And while he conforms himself to the usages of his own society, he will be tolerant to those of others. In this respect his maxim will be that of the Scythian prince: "With you such may be the custom—with us it is different."

So much for the general nature of the influence to which we are exposed from the circumstances of Society; it now remains to say what are the means by which this influence, as a source of error, may be counteracted.

Means by which the influence of society, as a source of error, may be counteracted.

It has been seen that, in consequence of the manner in which our opinions are formed for us by the accidents of society, our imposed and supposed knowledge is a confused medley of truths and errors. Here it is evidently necessary to institute a critical examination of the contents of this knowledge. Descartes proposes that, in order to discriminate, among our prejudiced opinions, the truths from the errors, we ought to commence by doubting all. This has exposed him to much obloquy and clamor, but most unjustly. The doctrine of Descartes has nothing skeptical or offensive; for he only maintains that it behooves us to examine all that has been inculcated on us from infancy, and under the masters to whose authority we have been subjected, with the same attention and circumspection which we accord to dubious questions. In fact there is nothing in the precept of Descartes, which had not been previously enjoined by other philosophers. Of these I formerly quoted to you several, and among others the remarkable testimonies of Aristotle, St. Augustin, and Lord Bacon.

Necessary to institute a critical examination of the contents of our knowledge.

Descartes,—his precept.

But although there be nothing reprehensible in the precept of Descartes, as enounced by him, it is of less practical utility in consequence of no account being taken of the circumstances which condition and modify its application. For, in the first place, the judgments to be

Conditions which modify its application.

examined ought not to be taken at random, but selected on a principle, and arranged in due order and dependence. But this requires no ordinary ability, and the distribution of things into their proper classes is one of the last and most difficult fruits of philosophy. In the second place, there are among our prejudices, or pretended cognitions, a great many hasty conclusions, the investigation of which requires much profound thought, skill, and acquired knowledge. Now, from both of these considerations, it is evident that to commence philosophy by such a review, it is necessary for a man to be a philosopher before he can attempt to become one. The precept of Descartes is, therefore, either unreasonable, or it is too unconditionally expressed. And this latter alternative is true.

A gradual and progressive abrogation of prejudices all that can be required of the student of philosophy.

What can be rationally required of the student of philosophy, is not a preliminary and absolute, but a gradual and progressive abrogation, of prejudices. It can only be required of him, that, when, in the course of his study of philosophy, he meets with a proposition which has not been already sufficiently sifted,—(whether it has been elaborated as a principle or admitted as a conclusion),—he should pause, discuss it without prepossession, and lay aside for future consideration all that has not been subjected to a searching scrutiny. The precept of Descartes, when rightly explained, corresponds to that of St. Paul: "If any man among you seemeth to be wise in this world, let him become a fool, that he may be wise;" that is, let him not rely more on the opinions in which he has been brought up, and in favor of which he and those around him are prejudiced, than on so many visions of imagination; and let him examine them with the

same circumspection as if he were assured that they contain some truth among much falsehood and many extravagances.

Proceeding now to the second class of the Sources of Error, which are found in the Mind itself, I shall commence with the following paragraph:

¶ V. The Sources of Error which arise from the Constitution, Habits, and Reciprocal Relations of the powers of Cognition, Feeling, and Desire, may be subdivided into two kinds. The first of these consists in the undue preponderance of the Affective Elements of mind (the Desires and Feelings) over the Cognitive; the second, in the weakness or inordinate strength of some one or other of the Cognitive Faculties themselves.

Par. V. II. Source of Error arising from the powers of Cognition, Feeling, and Desire,—of two kinds.

Affection is that state of mind in which the Feelings and Desires exert an influence not under the control of reason; in other words, a tendency by which the intellect is impeded in its endeavor to think an object as that object really is, and compelled to think it in conformity with some view prescribed by the passion or private interest of the subject thinking.

Explication.

I. Preponderance of Affection over Cognition.

The human mind, when unruffled by passion, may be compared to a calm sea. A calm sea is a clear mirror, in which the sun and clouds, in which the forms of heaven and earth, are reflected back precisely as they are presented. But let a wind arise, and the smooth, clear surface of the water is lifted into billows and agitated into foam. It no more reflects the sun and clouds, the forms of heaven and earth, or it reflects them only as distorted and broken images. In

Influence of Passion on the Mind.

like manner, the tranquil mind receives and reflects the world without as it truly is; but let the wind of passion blow, and every object is represented, not as it exists, but in the colors and aspects and partial phases in which it pleases the subject to regard it.

Boethius quoted.

The state of passion and its influence on the Cognitive Faculties are truly pictured by Boethius :—

" *Nubibus atris*
Condita nullum
Fundere possunt
Sidera lumen.
Si mare volvens
Turbidus auster
Misceat æstum,
Vitrea dudum,
Cernere verum,
Tramite recto
Carpere callem :
Gaudia pelle,
Pelle timorem,
Parque serenis
Unda diebus,
Mox resoluto
Sordida cœno,
Visibus obstat.
. . . . .
Tu quoque si vis
Lumine claro
Spemque fugato,
Nec dolor adsit,
Nubila mens est,
Vinctaque frenis,
Hæc ubi regnant."

Every error consists in this,—that we take something for non-existent, because we have not become aware of its existence, and that, in place of this existent something, we fill up the premises of a probable reasoning with something else.

Error limited to Probable Reasoning.

I have here limited the possibility of error to Probable Reasoning, for, in Intuition and Demonstration, there is but little Possibility of important error. Hobbes indeed asserts that had it been contrary to the interest of those in authority, that the three angles of a triangle should be equal to two right angles, this truth would have been long ago proscribed as heresy, or as high treason. This may be an ingenious illustration of the blind tendency of the passions to subjugate intelligence; but we should take it for more than

was intended by its author, were we to take it as more than an ingenious exaggeration. Limiting, therefore, error to probable inference (and this constitutes, with the exception of a comparatively small department, the whole domain of human reasoning), we have to inquire, How do the Passions influence us to the assumption of false premises? To estimate the amount of probability for or against a given proposition, requires a tranquil, an unbiassed, a comprehensive consideration, in order to take all the relative elements of judgment into due account. But this requisite state of mind is disturbed when any interest, any wish, is allowed to interfere.

¶ VI. The disturbing Passions may be reduced to four: Precipitancy, Sloth, Hope and Fear, Self-love.

Par. VI. The Passions, as sources of Error,—reduced to four.

1°, A restless anxiety for a decision begets impatience, which decides before the preliminary inquiry is concluded. This is precipitancy.

2°, The same result is the effect of Sloth, which dreams on in conformity to custom, without subjecting its beliefs to the test of active observation.

3°, The restlessness of Hope or Fear impedes observation, distracts attention, or forces it only on what interests the passion;—the sanguine looking on only what harmonizes with his hopes, the diffident only on what accords with his fears.

4°, Self-love perverts our estimate of probability by causing us to rate the grounds of judgment, not according to their real influence on the truth of the decision, but according to their bearing on our personal interests therein.

In regard to Impatience or Precipitation,—"all is the cause of this which determines our choice on one side rather than another. An imagination excites pleasure, and because it excites pleasure we yield ourselves up to it. We suppose, for example, that we are all that we ought to be, and why? Because this supposition gives us pleasure. This, in some dispositions, is one of the greatest obstacles to improvement; for he who entertains it, thinks there is no necessity to labor to become what he is already. "I believe," says Seneca, "that many had it in their power to have attained to wisdom, had they not been impeded by the belief that wisdom they had already attained. '*Multos puto ad sapientiam potuisse pervenire, nisi putassent se pervenisse.*'" Erasmus gives the following as the principal advice to a young votary of learning in the conduct of his studies: "To read the most learned books, to converse with the most learned men; but, above all, never to conceit that he himself was learned."

Explication.
1. Precipitancy.

Seneca.

Erasmus.

"From the same cause, men flatter themselves with the hope of dying old, although few attain to longevity. The less probable the event, the more certain are they of its occurrence; and why? Because the imagination of it is agreeable. '*Decrepiti senes paucorum annorum accessionem votis mendicant; minores natu seipsos esse fingunt; mendacio sibi blandiuntur; et tam libenter fallunt, quam si fata una decipiant.*'" "Preachers," says Montaigne, "are aware that the emotion which arises during their sermons animates themselves to belief, and we are conscious that when roused to anger we apply ourselves more intently to the defence of our

Illustrations.

From Seneca.

From Montaigne.

thesis, and embrace it with greater vehemence and approbation, than we did when our mind was cool and unruffled. You simply state your case to an advocate; he replies with hesitation and doubt; you are aware that it is indifferent to him whether he undertakes the defence of the one side or of the other; but have you once fee'd him well to take your case in hand; he begins to feel an interest in it; his will is animated. His reason and his science become also animated in proportion. Your case presents itself to his understanding as a manifest and indubitable truth; he now sees it in a wholly different light, and really believes that you have law and justice on your side." It is proper to observe that Montaigne was himself a lawyer,—he had been a counsellor of the Parliament of Bordeaux.

Precipitate Dogmatism and phases of the same disposition.

It might seem that Precipitate Dogmatism and an inclination to Skepticism were opposite characters of mind. They are, however, closely allied, if not merely phases of the same disposition. This is indeed confessed by the Skeptic Montaigne: "The most uneasy condition for me is to be kept in suspense on urgent occasions, and to be agitated between fear and hope. Deliberation, even in things of lightest moment, is very troublesome to me; and I find my mind more put to it, to undergo the various tumbling and tossing of doubt and consultation, than to set up its rest, and to acquiesce in whatever shall happen, after the die is thrown. Few passions break my sleep; but of deliberations, the least disturbs me."

Remedy for Precipitation.

Precipitation is no incurable disease. There is for it one sure and simple remedy, if properly applied. It is only required, to speak with Confucius, manfully to restrain the wild horse of precipitancy by the curb of consideration,—

to weigh the reasons of decision, each and all, in the balance of cool investigation, not to allow ourselves to decide until a clear consciousness has declared these reasons to be true,—to be sufficient; and, finally, to throw out of account the suffrages of self-love, of prepossession, of passion, and to admit only those of reflection, of experience, and of evidence. This remedy is certain and effectual. In theory it is satisfactory, but its practical application requires a moral resolution, for the acquisition of which no precept can be given.

In the second place, "Sloth is likewise a cause of precipitation, and it deserves the more attention as it is a cause of error extremely frequent, and one of which we are ourselves less aware, and which is less notorious to others. We feel it fatiguing to continue an investigation, therefore we do not pursue it; but as it is mortifying to think that we have labored in vain, we easily admit the flattering illusion that we have succeeded. By the influence of this disposition it often happens, that, after having rejected what first presented itself,—after having rejected a second time and a third time what subsequently turned up, because not sufficiently applicable or certain, we get tired of the investigation, and perhaps put up with the fourth suggestion, which is not better, haply even worse, than the preceding; and this simply because it has come into the mind when more exhausted and less scrupulous than it was at the commencement." "The volition of that man," says Seneca, "is often frustrated, who undertakes not what is easy, but who wishes what he undertakes to be easy. As often as you attempt anything, compare together yourself, the end which you propose, and the means by which it is to be accomplished.

2. Sloth.

Seneca quoted.

For the repentance of an unfinished work will make you rash. And here it is of consequence whether a man be of a fervid or of a cold, of an aspiring or of a humble, disposition."

Its remedy.

To remedy this failing it is necessary, in conformity with this advice of Seneca, to consult our forces, and the time we can afford, and the difficulty of the subjects on which we enter. We ought to labor only at intervals, to avoid the tedium and disquiet consequent on unremitted application; and to adjourn the consideration of any thought which may please us vehemently at the moment, until the prepossession in its favor has subsided with the animation which gave it birth.

3. Hope and Fear.

The two Causes of premature judgment—the affections of Impatience and Sloth—being considered, I pass on to the third principle of Passion, by which the intellect is turned aside from the path of truth,—I mean the disturbing influence of Hope and Fear. These passions, though reciprocally contrary, determine a similar effect upon the deliberations of the Understanding, and are equally unfavorable for the interest of truth. In forming a just conclusion upon a question of probable reasoning, that is, where the grounds of decision are not few, palpable, and of determinate effect,—and such questions may be said to be those alone on which differences of opinion may arise, and are, consequently, those alone which require for their solution any high degree of observation and ingenuity,—in such questions hope and fear exert a very strong and a very unfavorable influence. In these questions it is requisite, in the first place, to seek out the premises; and, in the second, to draw the conclusion. Of these requisites the first is the more important, and it is also by far the more difficult.

How Hope and Fear operate unfavorably on the Understanding.

Now the passions of Hope and Fear operate severally to prevent the intellect from discovering all the elements of decision, which ought to be considered in forming a correct conclusion, and cause it to take into account those only which harmonize with that conclusion to which the actuating passion is inclined. And here the passion operates in two ways. In the first place, it tends so to determine the associations of thought, that only those media of proof are suggested or called into consciousness, which support the conclusion to which the passion tends. In the second place, if the media of proof by which a counter conclusion is supported are brought before the mind, still the mind is influenced by the passion to look on their reality with doubt, and, if such cannot be questioned, to undervalue their inferential importance; whereas it is moved to admit, without hesitation, those media of proof which favor the conclusion in the interest of our hope or fear, and to exaggerate the cogency with which they establish this result. Either passion looks exclusively to a single end, and exclusively to the means by which that single end is accomplished. Thus the sanguine temperament, or the mind under the habitual predominance of hope, sees only and magnifies all that militates in favor of the wished-for consummation, which alone it contemplates; whereas the melancholic temperament, or the mind under the habitual predominance of fear, is wholly occupied with the dreaded issue, views only what tends to its fulfilment, while it exaggerates the possible into the probable, the probable into the certain. Thus it is that whatever conclusion we greatly hope or greatly fear, to that conclusion we are disposed to leap; and it has become almost proverbial, that men

lightly believe both what they wish, and what they dread, to be true.

But the influence of Hope on our judgments, inclining us to find whatever we wish to find, in so far as this arises from the illusion of Self-love, is comprehended in this,—the fourth cause of error,—to which I now proceed.

4. Self-love.

Self-love, under which I include the dispositions of Vanity, Pride, and, in general, all those which incline us to attribute an undue weight to those opinions in which we feel a personal interest, is by far the most extensive and influential in the way of reason and truth. In virtue of this principle, whatever is ours—whatever is adopted or patronized by us, whatever belongs to those to whom we are attached is either gratuitously clothed with a character of truth, or its pretensions to be accounted true are not scrutinized with the requisite rigor and impartiality. I am a native of this country, and, therefore, not only is its history to me a matter of peculiar interest, but the actions and character of my countrymen are viewed in a very different light from that in which they are regarded by a foreigner. I am born and bred a member of a religious sect, and because they constitute my creed, I find the tenets of this sect alone in conformity to the Word of God. I am the partisan of a philosophical doctrine, and am, therefore, disposed to reject whetever does not harmonize with my adopted system.

Aristotle,—his precept.

"It is the part of a philosopher," says Aristotle, "inasmuch as he is a philosopher, to subjugate self-love, and to refute, if contrary to truth, not only the opinions of his friends, but the doctrines which he himself may have professed." It is certain, however, that philosophers—for philosophers are

men—have been too often found to regulate their conduct by the same opposite principle. That man pretended to the name of philosopher, who scrupled not to declare that he would rather be in the wrong with Plato than in the right with his opponents. "Gisbert Voetius urged Mersennus to refute a work of Descartes' a year before the book appeared, and before he had himself the means of judging whether the opinions it contained were right or wrong. A certain professor of philosophy in Padua came to Galileo, and requested that he would explain to him the meaning of the term *parallaxis;* which he wished, he said, to refute, having heard that it was opposed to Aristotle's doctrine, touching the relative situation of the comets. 'What!' answered Galileo, 'you wish to controvert a word the meaning of which you do not know!' Redi tells us that a sturdy Peripatetic of his acquaintance would never consent to look at the heavens through a telescope, lest he should be compelled to admit the existence of the new stars discovered by Galileo and others. The same Redi informs us that he knew another Peripatetic, a staunch advocate of the Aristotlean doctrine of equivocal generation, (a doctrine, by the way, which now again divides the physiologists of Europe), and who, in particular, maintained that the green frogs which appear upon a shower come down with the rain, who would not be induced himself to select and examine one of these frogs. And why? Because he was unwilling to be convicted of his error, by Redi showing him the green matter in the stomach, and its feculæ in the intestines of the animal." The spirit of the Peripatetic philosophy was, however, wholly misunderstood by these mistaken followers of Aristotle; for a true Aristotelian is one who listens

Illustrations of the influence of Self-love on our opinions.

rather to the voice of nature than to the precept of any master, and it is well expressed in the motto of the great French anatomist—*Riolanus est Peripateticus; credit ea, et ea tantum, quæ vidit.* From the same principle proceeds the abuse, and sometimes even the persecution, which the discoverers of new truths encounter from those who cherished opinions these truths subvert.

Self-love leads us to regard with favor the opinions of those to whom we are in any way attached.

In like manner, as we are disposed to maintain our own opinion, we are inclined to regard with favor the opinions of those to whom we are attached by love, gratitude, and other conciliatory affections. "We do not limit our attachment to the persons of our friends,—we love in a certain sort all that belongs to them; and as men generally manifest sufficient ardor in support of their opinions, we are led insensibly by a kind of sympathy to credit, to approve, and to defend these also, and that even more passionately than our friends themselves. We bear affection to others for various reasons. The agreement of tempers, of inclinations, of pursuits; their appearance, their manners, their virtue, the partiality which they have shown to us, the services we have received at their hands, and many other particular causes, determine and direct our love.

Malebranche adduced to this effect.

"It is observed by the great Malebranche, that if any of our friends,—any even of those we are disposed to love,—advance an opinion, we forthwith lightly allow ourselves to be persuaded of its truth. This opinion we accept and support, without troubling ourselves to inquire whether it be conformable to fact, frequently even against our conscience, in conformity to the darkness and confusion of our intellect, to

the corruption of our heart, and to the advantages which we hope to reap from our facility and complaisance."

The influence of this principle is seen still more manifestly when the passion changes; for though the things themselves remain unaltered, our judgments concerning them are totally reversed. How often do we behold persons who cannot, or will not, recognize a single good quality in an individual from the moment he has chanced to incur their dislike, and who are even ready to adopt opinions, merely because opposed to others maintained by the object of their aversion? The celebrated Arnauld goes so far even as to assert, that men are naturally envious and jealous; that it is with pain they endure the contemplation of others in the enjoyment of advantages which they do not themselves possess; and, as the knowledge of truth and the power of enlightening mankind is one of these, that they have a secret inclination to deprive them of that glory. This accordingly often determines them to controvert without a ground the opinions and discoveries of others. Self-love accordingly often argues thus:—'This is an opinion which I have originated, this is an opinion, therefore, which is true;' whereas the natural malignity of man not less frequently suggests such another: 'It is another than I who has advanced this doctrine; this doctrine is, therefore, false.'

This shown especially when the passion changes.

Arnauld holds that man is naturally envious.

We may distinguish, however, from malignant or envious contradiction another passion, which, though more generous in its nature and not simply a mode of Self-love, tends, nevertheless, equally to divert us from the straight road of truth,—I mean Pugnacity, or the love of Disputation.

The love of Disputation.

Under the influence of this passion, we propose as our end victory, not truth. We insensibly become accustomed to find a reason for any opinion, and, in placing ourselves above all reasons, to surrender our belief to none. Thus it is why two disputants so rarely ever agree, and why a question is seldom or never decided in a discussion, where the combative dispositions of the reasoners have once been roused in activity. In controversy it is always easy to find wherewithal to reply; the end of the parties is not to avoid error, but to impose silence; and they are less ashamed of continuing wrong than of confessing that they are not right.

These affections may be said to be the immediate causes of all error. Other causes there are, but not immediate. In so far as Logic detects the sources of our false judgments and shows their remedies, it must carefully inculcate that no precautionary precept for particular cases can avail, unless the inmost principle of the evil be discovered, and a cure applied. You must, therefore, as you would remain free from the hallucination of false opinion, be convinced of the absolute necessity of following out the investigation of every question calmly and without passion. You must learn to pursue, and to estimate, truth without distraction or bias. To this there is required, as a primary condition, the unshackled freedom of thought, the equal glance which can take in the whole sphere of observation, the cool determination to pursue the truth whithersoever it may lead; and, what is still more important, the disposition to feel an interest in truth and in truth alone. If perchance some collateral interest may first prompt us to the inquiry, in our general interest for

These affections the immediate causes of all error.

Preliminary conditions requisite for the efficiency of precepts against the sources of error.

truth we must repress,—we must forget, this interest, until the inquiry be concluded. Of what account are the most venerated opinions if they be untrue? At best they are only venerable delusions. He who allows himself to be actuated in his scientific procedure by any partial interest, can never obtain a comprehensive survey of the whole he has to take into account, and always, therefore, remains incapable of discriminating, with accuracy, error from truth. The independent thinker must, in all his inquiries, subject himself to the genius of truth,—must be prepared to follow her footsteps without faltering or hesitation. In the consciousness that truth is the noblest of ends, and that he pursues this end with honesty and devotion, he will dread no consequences,—for he relies upon the truth. Does he compass the truth, he congratulates himself upon his success; does he fall short of its attainment, he knows that even his present failure will ultimately advance him to the reward he merits. Err he may, and that perhaps frequently, but he will never deceive himself. We cannot, indeed, rise superior to our limitary nature, we cannot, therefore, be reproached for failure; but we are always responsible for the calmness and impartiality of our researches, and these alone render us worthy of success. But though it be manifest, that to attain the truth we must follow whithersoever the truth may lead, still men in general are found to yield not an absolute, but only a restricted, obedience to the precept. They capitulate, and do not unconditionally surrender. I give up, but my cherished dogma in religion must not be canvassed, says one;—my political principles are above inquiry, and must be exempted, says a second;—my country is the land of lands, this cannot be disallowed, cries a third;—my order, my

vocation, is undoubtedly the noblest, exclaim a fourth and fifth;—only do not require that we should confess our having erred, is the condition which many insist on stipulating. Above all, that resolve of mind is difficult, which is ready to surrender all fond convictions, and is prepared to recommence investigation the moment that a fundamental error in the former system of belief has been detected. These are the principal grounds why, among men, opinion is so widely separated from opinion; and why the clearest demonstration is so frequently for a season frustrated of victory.

Par. VII. Rules against Errors from the Affections.

¶ VII. Against the Errors which arise from the Affections, there may be given the three following rules:

1°, When the error has arisen from the influence of an active affection, the decisive judgment is to be annulled; the mind is then to be freed, as far as possible, from passion, and the process of inquiry to be recommenced as soon as the requisite tranquility has been restored.

2°, When the error has arisen from a relaxed enthusiasm for knowledge, we must reanimate this interest by a vivid representation of the paramount dignity of truth, and of the lofty destination of our intellectual nature.

3°, In testing the accuracy of our judgments, we must be particularly suspicious of those results which accord with our private inclinations and predominant tendencies.

These rules require no comment.

LECTURE IV.—MODIFIED STOICHEIOLOGY.

SECTION II.—ERROR,—ITS CAUSES AND REMEDIES.

B.—AS IN THE COGNITIONS, FEELINGS, AND DESIRES.

II.—WEAKNESS AND DISPROPORTIONED STRENGTH OF THE FACULTIES OF KNOWLEDGE.

Weakness and Disproportioned Strength of the Faculties of Knowledge.

I now go on to the Second Head of the class of Errors founded on the Natural Constitution, the Acquired Habits, and the Reciprocal Relations of our Cognitive and Affective Powers, that is, to the Causes of Error which originate in the Weakness or Disproportioned Strength of one or more of our Faculties of Knowledge themselves.

Neglect of the Limited Nature of the Human Intellect a source of error.

Here, in the first place, I might consider the errors which have arisen from the Limited Nature of the Human Intellect in general,—or rather from the mistakes that have been made by philosophers in denying or not taking this limited nature into account. The illustration of this subject is one which is relative to, and supposes an acquaintance with, some of the abstrucest speculations in Philosophy, and which belong not to Logic, but to Metaphysics. I shall not, therefore, do more than

simply indicate at present, what it will be proper at another season fully to explain. It is manifest, that, if the human mind be limited,—if it only knows as it is conscious, and if it be only conscious, as it is conscious of contrast and opposition, of an ego and non-ego,—if this supposition, I say, be correct, it is evident that those philosophers are in error, who virtually assume that the human mind is unlimited, that is, that the human mind is capable of a knowledge superior to consciousness,—a cognition in which knowledge and existence—the Ego and non-Ego—God and the creature—are identical; that is, of an act in which the mind is the Absolute, and knows the Absolute. This philosophy, the statement of which, as here given, it would require a long commentary to make you understand, is one which has for many years been that dominant in Germany; it is called the *Philosophy of the Absolute*, or the *Philosophy of Absolute Identity*. This system, of which Schelling and Hegel are the great representatives, errs by denying the limitation of human intelligence without proof, and by boldly building its edifice on this gratuitous negation.

1. Philosophy of the Absolute.

But there are other forms of philosophy which err not in actually postulating the infinity of mind, but in taking only a one-sided view of its finitude. It is a general fact, which seems, however, to have escaped the observation of philosophers, that whatever we can positively compass in thought,—whatever we can conceive as possible,—in a word, the *omne cogitabile*, lies between two extremes or poles, contradictorily opposed, and one of which must consequently be true, but of neither of which repugnant opposites are we able to represent to our mind the possibility. To take one

2. A one-sided view of the finitude of mind.

example out of many: we cannot construe to the mind as possible the absolute commencement of time; but we are equally unable to think the possibility of the counter alternative,—its infinite or absolute non-commencement, in other words, the infinite regress of time. Now it is evident, that, if we looked merely at the one of these contradictory opposites and argued thus: whatever is inconceivable is impossible, the absolute commencement of time is inconceivable, therefore the absolute commencement of time is impossible; but on the principles of Contradiction and Excluded Middle, one or other of the two opposite contradictories must be true; therefore, as the absolute commencement of time is impossible, the absolute or infinite non-commencement of time is necessary:—I say, it is evident that this reasoning would be incompetent and one-sided, because it might be converted; for, by the same one-sided process, the opposite conclusion might be drawn in favor of the absolute commencement of time.

Illustrated by reference to the two contradictories,—the absolute commencement, and the infinite non-commencement of Time.

Now, the unilateral and incompetent reasoning which I have here supposed in the case of time, is one of which the Necessitarian is guilty in his argument to prove the impossibility of human volitions being free. He correctly lays down, as the foundation of his reasoning, two propositions which must at once be allowed: 1°, That the notion of the liberty of volition involves the supposition of an absolute commencement of volition, that is, of a volition which is a cause, but is not itself, *qua* cause, an effect. 2°, That the absolute commencement of a volition, or of aught else, cannot be conceived,

The same principle exemplified in the case of the Necessitarian Argument against the Freedom of the Human Will.

that is, cannot be directly or positively thought as possible. So far he is correct; but when he goes on to apply these principles by arguing (and be it observed this syllogism lies at the root of all the reasonings for necessity), *Whatsoever is inconceivable is impossible; but the supposition of the absolute commencement of volition is inconceivable; therefore, the supposition of the absolute commencement of volition (the condition of free-will) is impossible,*—we may here demur to the sumption, and ask him,—Can he positively conceive the opposite contradictory of the absolute commencement, that is, an infinite series of relative non-commencements? If he answers, as he must, that he can not, we may again ask him,—By what right he assumed as a self-evident axiom for his sumption, the proposition—that *whatever is inconceivable is impossible*, or by what right he could subsume his minor premise, when by his own confession he allows that the opposite contradictory of his minor premise, that is, the very proposition he is apagogically proving, is, likewise, inconceivable, and, therefore, on the principle of his sumption, likewise impossible.

And in the case of the Libertarian Argument in behalf of Free-will.

The same inconsequence would equally apply to the Libertarian, who should attempt to prove that free-will must be allowed, on the ground that its contradictory opposite is impossible, because inconceivable. He cannot prove his thesis by such a process; in fact, by all speculative reasoning from the conditions of thought, the two doctrines are *in æquilibrio;*—both are equally possible,—both are equally inconceivable. It is only when the Libertarian descends to arguments drawn from the fact of the Moral Law and its conditions, that he

is able to throw in reasons which incline the balance in his favor.

On these matters I, however, at present, only touch, in order to show you under what head of Error these reasonings would naturally fall.

Weakness or disproportioned strength of the several Cognitive Faculties,—a source of Error.

Leaving, therefore, or adjourning, the consideration of the imbecility of the human intellect in general, I shall now take into view, as a source of logical error, the Weakness or Disproportioned Strength of the several Cognitive Faculties. Now, as the Cognitive Faculties in man consist partly of certain Lower Powers, which he possesses in common with other sensible existences, namely, the Presentative, the Retentive, the Representative and the Reproductive Faculties, and partly of certain higher Powers, in virtue of which he enters into the rank of intelligent existences, namely, the Elaborative and Regulative Faculties,—it will be proper to consider the powers of these two classes severally in succession, in so far as they may afford the causes or occasions of error.

Cognitive Faculties of two classes, a Lower and a Higher.

I. The Lower Class,—1. The Presentative Faculty.

Of the lower class, the first faculty in order is the Presentative or Acquisitive Faculty. This, as you remember, is divided into two, viz., into the Faculty which presents us with the phenomena of the outer world, and into the faculty which presents us with the phenomena of the inner. The former is External Perception, or External Sense; the latter is Self-consciousness, Internal Perception, or Internal Sense. I commence, therefore, with the Faculty of External Perception, in relation to which I give you the following paragraph:

¶ VII. When aught is presented through the outer senses, there are two conditions necessary for its adequate perception :— 1°, The relative Organs must be present, and in a condition to discharge their functions ; and 2°, The objects themselves must bear a certain relation to these organs, so that the latter shall be suitably affected, and thereby the former suitably apprehended. It is possible, therefore, that, partly through the altered condition of the organs, partly through the altered situation of the objects, dissimilar presentations of the same, and similar presentations of different, objects, may be the result.

Par. VII. (a) External Perception,—as a source of Error.

In the first place, without the organs specially subservient to External Perception,—without the eye, the ear, etc., sensible perceptions of a precise and determinate character, such, for example, as color or sound, are not competent to man. In the second place, to perform their functions, these organs must be in a healthy or normal state ; for if this condition be not fulfilled, the presentations which they furnish are null, incomplete, or false. But, in the third place, even if the organs of sense are sound and perfect, the objects to be presented and perceived must stand to these organs in a certain relation,—must bear to them a certain proportion ; for, otherwise, the objects cannot be presented at all, or cannot be perceived without illusion. The sounds, for example, which we are to hear, must neither be too high nor too low in quality ; the bodies which we are to see, must neither be too near nor too distant,—must neither be too feebly nor too intensely illuminated. In relation to the second condition,

Explication.

Conditions of the adequate activity of External Perception.

there are given, in consequence of the altered state of the organs, on the one hand, different presentations of the same object;—thus to a person who has waxed purblind, his friend appears as an utter stranger, the eye now presenting its objects with less clearness and distinctness. On the other hand, there are given the same, or undistinguishably similar, presentations of different objects;—thus to a person in the jaundice, all things are presented yellow. In relation to the third condition, from the altered position of objects, there are, in like manner, determined, on the one hand, different presentations of the same objects,—as when the stick which appears straight in the air appears crooked when partially immersed in water; and, on the other hand, identical presentations of different objects, as when a man and a horse appear in the distance to be so similar, that the one cannot be discriminated from the other. In all these cases, these illusions are determined,—illusions which may easily become the occasions of false judgments.

Possible illusions of the Senses.

In regard to the detection of such illusions and obviating the error to which they lead, it behooves us to take the following precautions. We must, in the first place, examine the state of the organ. If found defective, we must endeavor to restore it to perfection; but if this cannot be done, we must ascertain the extent and nature of the evil, in order to be upon our guard in regard to quality and degree of the false presentation.

Precautions with a view to the detection of illusions of the Senses, and obviating the errors to which they lead.

In the second place, we must examine the relative situation of the object, and if this be not accommodated to the organ, we must either obviate the disproportion and

remove the media which occasion the illusion, or repeat the observation under different circumstances, compare these, and thus obtain the means of making an ideal abstraction of the disturbing causes.

In regard to the other Presentative Faculty,—the Faculty of Self-consciousness,—Internal Perception, or Internal Sense, as we know less of the material conditions which modify its action, we are unable to ascertain so precisely the nature of the illusions of which it may be the source. In reference to this subject you may take the following paragraph :

¶ VIII. The faculty of Self-consciousness, or Internal Sense, is subject to various changes, which either modify our apprehensions of objects, or influence the manner in which we judge concerning them. In so far, therefore, as false judgments are thus occasioned, Self-consciousness is a source of error.

Par. VIII. (b) Self-consciousness,—as a source of Error.

It is a matter of ordinary observation, that the vivacity with which we are conscious of the various phenomena of mind, differs not only at different times, in different states of health, and in different degrees of mental freshness and exhaustion, but, at the same time, differs in regard to the different kinds of these phenomena themselves. According to the greater or less intensity of this faculty, the same thoughts of which we are conscious are, at one time, clear and distinct, at another, obscure and confused. At one time we are almost wholly incapable of reflection, and every act of self attention is forced and irksome, and differences the most marked pass unnoticed ; while, at another our self-consciousness is alert, all its applications pleasing,

Explication. Self-consciousness varies in intensity.

and the most faint and fugitive phenomena arrested and observed. On one occasion, Self-consciousness, as a reflective cognition, is strong; on another, all reflection is extinguished in the intensity of the direct consciousness of feeling or desire. In one state of mind our representations are feeble; in another, they are so lively that they are mistaken for external realities. Our self-consciousness may thus be the occasion of frequent error; for, according to its various modifications, we may form the most opposite judgments concerning the same things,—pronouncing them, for example, now to be agreeable, now to be disagreeable, according as our Internal Sense is variously affected.

The next is the Retentive or Conservative Faculty,—Memory strictly so called; in reference to which I give you the following paragraph:

¶ IX. Memory, or the Conservative Faculty, is the occasion of Error, both when too weak and when too strong. When too weak, the complement of cognitions which it retains is small and indistinct, and the Understanding or Elaborative Faculty is, consequently, unable adequately to judge concerning the similarity and differences of its representations and concepts. When too strong, the Understanding is overwhelmed with the multitude of acquired cognitions simultaneously forced upon it, so that it is unable calmly and deliberately to compare and discriminate these.

Par. IX. 2. Memory,—as a source of Error.

That both these extremes,—that both the insufficient and the superfluous vigor of the Conservative Faculty are severally the sources of Error, it will not require many observations to make apparent.

Explication.

Feeble Memory.

In regard to a feeble memory, it is manifest that a multitude of false judgments must inevitably arise from an incapacity in this faculty to preserve the observations committed to its keeping. In consequence of this incapacity, if a cognition be not wholly lost, it is lost at least in part, and the circumstances of time, place, persons and things confounded with each other. For example,—I may recollect the tenor of a passage I have read, but from defect of memory may attribute to one author what really belongs to another. Thus a botanist may judge two different plants to be identical in species, having forgotten the differential characters by which they were discriminated; or he may hold the same plant to be two different species, having examined it at different times and places.

Strong Memory.

Though nothing could be more erroneous than a general and unqualified decision, that a great memory is incompatible with a sound judgment, yet it is an observation confirmed by the experience of all ages and countries, not only that a great memory is no condition of high intellectual talent, but that great memories are very frequently found in combination with comparatively feeble powers of thought. The truth seems to be, that where a vigorous memory is conjoined with a vigorous intellect, not only does the force of the subsidiary faculty not detract from the strength of the principal, but, on the contrary, tends to confer on it a still higher power; whereas when the inferior faculty is disproportionately strong, that so far from nourishing and corroborating the superior, it tends to reduce this faculty to a lower level than that at which it would have stood, if united with a less overpowering subsidiary. The greater the magazine of

various knowledge which the memory contains, the better for the understanding, provided the understanding can reduce this various knowledge to order and subjection. A great memory is the principal condition of bringing before the mind many different representations and notions at once, or in rapid succession. This simultaneous or nearly simultaneous presence disturbs, however, the tranquil comparison of a small number of ideas, which, if it shall judge aright, the intellect must contemplate with a fixed and steady attention. Now, where an intellect possesses the power of concentration in a high degree, it will not be harrassed in its meditations by the officious intrusions of the subordinate faculties, however vigorous these in themselves may be, but will control their vigor by exhausting in its own operations the whole applicable energy of mind. Whereas where the inferior is more vigorous than the superior, it will, in like manner, engross in its own function the disposable amount of activity, and overwhelm the principal faculty with materials, many even in proportion as it is able to elaborate few. This appears to me the reason why men of strong memories are so often men of proportionally weak judgments, and why so many errors arise from the possession of a faculty, the perfection of which ought to exempt them from many mistaken judgments.

Remedies for these opposite extremes.

As to the remedy for these opposite extremes. The former—the imbecility of memory—can only be alleviated by invigorating the capacity of Retention through mnemonic exercises and methods; the latter,—the inordinate vigor of Memory,—by cultivating the Understanding to the neglect of the Conservative Faculty. It will, likewise, be necessary to be upon our guard against the errors originating in these

counter sources. In the one case distrusting the accuracy of facts, in the other, the accuracy of their elaboration.

3. The Reproductive Faculty.

The next faculty is the Reproductive. This, when its operation is voluntarily exerted, is called *Recollection* or *Reminiscence;* when it energizes spontaneously or without volition, it is called *Suggestion.* The laws by which it is governed in either case, but especially in the latter, are called the *Laws of Mental Association.* This Reproductive Faculty, like the Retentive, is the cause of error, both if its vigor be defective, or if it be too strong. I shall consider Recollection and Suggestion severally and apart. In regard to the former I give you the following paragraph.

Par. X. (a) Reminiscence—as a source of Error.

¶ X. The Reproductive Faculty, in so far as it is voluntarily exercised, as Reminiscence, becomes a source of Error, as it is either too sluggish or too prompt, precisely as the Retentive Faculty, combined with which it constitutes Memory in the looser signification.

Explication. Reminiscence,—its undue activity.

It is necessary to say very little in special reference to Reminiscence, for what was said in regard to the Conservative Faculty or Memory Proper in its highest vigor, was applicable to, and in fact supposed a corresponding degree of, the Reproductive. For, however great may be the mass of cognitions retained in the mind, that is, out of consciousness, but potentially capable of being called into consciousness, these can never of themselves oppress the Understanding by their simultaneous crowding or rapid succession, if the faculty by which they are revoked into consciousness be inert; whereas if this revocative faculty

be comparatively alert and vigorous, a smaller magazine of retained cognitions may suffice to harass the intellect with a ceaseless supply of materials too profuse for its capacity of elaboration.

Its inactivity.

On the other hand, the inactivity of our Recollection is a source of error, precisely as the weakness of our Memory proper; for it is of the same effect in relation to our judgments, whether the cognitions requisite for a decision be not retained in the mind, or whether, being retained, they are not recalled into consciousness by Reminiscence.

In regard to Suggestion, or the Reproductive Faculty operating spontaneously, that is, not in subservience to an act of Will,—I shall give you the following paragraph:

Par. XI. (b) Suggestion—as a source of Error.

¶ XI. As our Cognitions, Feelings, and Desires are connected together by what are called the *Laws of Association*, and as each link in the chain of thought suggests or awakens into consciousness some other in conformity to these Laws,—these Laws, as they bestow a strong subjective connection on thoughts and objects of a wholly arbitrary union, frequently occasion great confusion and error in our judgments.

Explication.

Even in methodical thinking, we do not connect all our thoughts intentionally and rationally, but many press forward into the train, either in consequence of some external impression, or in virtue of certain internal relations, which, however, are not of a logical dependency. Thus thoughts tend to suggest each other, which have reference to things of which we were previously cognizant as coëxistent, or as immediately con-

sequent, which have been apprehended as bearing a resemblance to each other, or which have stood together in reciprocal and striking contrast. This connection, though precarious and non-logical, is thus, however, governed by certain laws, which have been called the *Laws of Association*. These laws, which I have just enumerated, viz., the Law of Coëxistence or Simultaneity, the Law of Continuity or Immediate Succession, the Law of Similarity, and the Law of Contrast, are all only special modifications of one general law, which I would call the *Law of Redintegration;* that is, the principle according to which whatever has previously formed a part of one total act of consciousness, tends, when itself recalled into consciousness, to reproduce along with it the other parts of that original whole. But though these tendencies be denominated *laws*, the influence which they exert, though often strong and sometimes irresistible, is only contingent; for it frequently happens that thoughts which have previously stood to each other in one or other of the four relations do not suggest each other. The Laws of Association stand, therefore, on a very different footing from the laws of logical connection. But those Laws of Association, contingent though they be, exert a great and often a very pernicious influence upon thought, inasmuch as by the involuntary intrusion of representations into the mental chain which are wholly irrelevant to the matter in hand, there arises a perplexed and redundant tissue of thought, into which false characters may easily find admission, and in which true characters may easily be overlooked. But this is not all. For, by being once blended together in our consciousness, things really distinct in their nature tend again naturally to reassociate, and, at every repetition of this

conjunction, this tendency is fortified, and their mutual suggestion rendered more certain and irresistible.

Influence of Association in matters of Taste.

It is in virtue of this principle of Association and Custom, that things are clothed by us with the precarious attributes of deformity or beauty; and some philosophers have gone so far as to maintain that our principles of Taste are exclusively dependent on the accidents of Association. But if this be an exaggeration, it is impossible to deny that Association enjoys an extensive jurisdiction in the empire of taste, and, in particular, that fashion is almost wholly subject to its control.

Stewart quoted.

On this subject I may quote a few sentences from the first volume of Mr. Stewart's *Elements*. "In matters of Taste, the effects which we consider are produced on the mind itself, and are accompanied either with pleasure or with pain. Hence the tendency to casual association is much stronger than it commonly is with respect to physical events; and when such associations are once formed, as they do not lead to any important inconvenience, similar to those which result from physical mistakes, they are not so likely to be corrected by mere experience, unassisted by study. To this it is owing that the influence of association on our judgments concerning beauty and deformity, is still more remarkable than on our speculative conclusions; a circumstance which has led some philosophers to suppose that association is sufficient to account for the origin of these notions, and that there is no such thing as a standard of taste, founded on the principles of the human constitution. But this is undoubtedly pushing the theory a great deal too far. The association of ideas can never account for the origin of a

new notion, or of a pleasure essentially different from all the others which we know. It may, indeed, enable us to conceive how a thing indifferent in itself may become a source of pleasure, by being connected in the mind with something else which is naturally agreeable; but it presupposes, in every instance, the existence of those notions and those feelings which it is its province to combine; insomuch that, I apprehend, it will be found, wherever associations produce a change in our judgments on matters of taste, it does so by co-operating with some natural principle of the mind, and implies the existence of certain original sources of pleasure and uneasiness.

"A mode of dress, which at first appeared awkward, acquires, in a few weeks or months, the appearance of elegance. By being accustomed to see it worn by those whom we consider as models of taste, it becomes associated with the agreeable impressions which we receive from the ease and grace and refinement of their manners. When it pleases by itself, the effect is to be ascribed, not to the object actually before us, but to the impressions with which it has been generally connected, and which it naturally recalls to the mind.

"This observation points out the cause of the perpetual vicissitudes in dress, and in everything whose chief recommendation arises from fashion. It is evident that, as far as the agreeable effect of an ornament arises from association, the effect will continue only while it is confined to the higher orders. When it is adopted by the multitude, it not only ceases to be associated with ideas of taste and refinement, but it is associated with ideas of affectation, absurd imitation, and vulgarity. It is accordingly laid aside by the higher orders, who studiously avoid every cir-

cumstance in external appearance which is debased by low and common use; and they are led to exercise their invention in the introduction of some new peculiarities, which first become fashionable, then common, and last of all, are abandoned as vulgar.

"Our moral judgments, too, may be modified, and even perverted to a certain degree, in consequence of the operation of the same principle. In the same manner in which a person who is regarded as a model of taste may introduce, by his example, an absurd or fantastical dress; so a man of splendid virtues may attract some esteem also to his imperfections; and, if placed in a conspicuous situation, may render his vices and follies objects of general imitation among the multitude.

"'In the reign of Charles II.,' says Mr. Smith, 'a degree of licentiousness was deemed the characteristic of a liberal education. It was connected, according to the notions of those times, with generosity, sincerity, magnanimity, loyalty; and proved that the person who acted in this manner was a gentleman, and not a puritan. Severity of manners, and regularity of conduct, on the other hand, were altogether unfashionable, and were connected, in the imagination of that age, with cant, cunning, hypocrisy, and low manners. To superficial minds the vices of the great seem at all times agreeable. They connect them not only with the splendor of fortune, but with many superior virtues which they ascribe to their superiors; with the spirit of freedom and independency; with frankness, generosity, humanity, and politeness. The virtues of the inferior ranks of people, on the contrary,—their parsimonious frugality, their painful industry, and rigid adherence to rules, seem to them mean and disagreeable. They connect

them both with the meanness of the station to which these qualities commonly belong, and with many great vices which they suppose usually accompany them; such as an abject, cowardly, ill-natured, lying, pilfering disposition.'"

Condillac quoted on the influence of Association.

"In general," says Condillac, "the impression we experience in the different circumstances of life, makes us associate ideas with a force which renders them ever after for us indissoluble. We cannot, for example, frequent the society of our fellow-men without insensibly associating the notions of certain intellectual or moral qualities with certain corporeal characters. This is the reason why persons of a decided physiognomy please or displease us more than others; for a physiognomy is only an assemblage of characters, with which we have associated notions which are not suggested without an accompaniment of satisfaction or disgust. It is not, therefore, to be marvelled at that we judge men according to their physiognomy, and that we sometimes feel towards them at first sight aversion or inclination. In consequence of these associations, we are often vehemently prepossessed in favor of certain individuals, and no less violently disposed against others. It is because all that strikes us in our friends or in our enemies is associated with the agreeable or the disagreeable feeling which we severally experience; and because the faults of the former borrow always something pleasing from their amiable qualities; whereas the amiable qualities of the latter seem always to participate of their vices. Hence it is that these associations exert a powerful influence on our whole conduct. They foster our love or hatred; enhance our esteem or contempt; excite our gratitude or indignation; and produce those sympathies,—those antipathies, or those

capricious inclinations, for which we are sometimes sorely puzzled to render a reason. Descartes tells us that through life he had always found a strong predilection for squint eyes,—which he explains by the circumstance, that the nursery-maid by whom he had been kindly tended, and to whom as a child he was, consequently, much attached, had this defect." 'S Gravesande, I think it is, who tells us he knew a man, and a man otherwise of sense, who had a severe fall from a waggon; and thereafter he could never enter a waggon without fear and trembling, though he daily used, without apprehension, another and far more dangerous vehicle. A girl once and again sees her mother or maid fainting and vociferating at the appearance of a mouse; if she has afterwards to escape from danger, she will rather pass through flames than take a patent way, if obstructed by a *ridiculus mus*. A remarkable example of the false judgments arising from this principle of association, is recorded by Herodotus and Justin, in reference to the war of the Scythians with their slaves. The slaves, after they had repeatedly repulsed several attacks with arms, were incontinently put to flight when their masters came out against them with their whips.

I shall now offer an observation in regard to the appropriate remedy for this evil influence of Association

Only remedy for the influence of Association is the Philosophy of the Human Mind.

The only mean by which we can become aware of, counteract, and overcome, this besetting weakness of our nature, is Philosophy,—the Philosophy of the Human Mind; and this studied both in the consciousness of the individual, and in the history of the species. The philosophy of mind, as studied in the consciousness of the individual, exhibits to us the source and

nature of the illusion. It accustoms us to discriminate the casual, from the necessary, combinations of thought; it sharpens and corroborates our faculties, encourages our reason to revolt against the blind preformations of opinion, and finally enables us to break through the enchanted circle within which Custom and Association had enclosed us. But in the accomplishment of this end, we are greatly aided by the study of man under the various circumstances which have concurred in modifying his intellectual and moral character. In the great spectacle of history, we behold in different ages and countries the predominance of different systems of association, and these ages and countries are, consequently, distinguished by the prevalence of different systems of opinions. But all is not fluctuating; and, amid the ceaseless changes of accidental circumstances and precarious beliefs, we behold some principles ever active, and some truths always commanding a recognition. We thus obtain the means of discriminating, in so far as our unassisted reason is conversant about mere worldly concerns, between what is of universal and necessary certainty, and what is only of local and temporary acceptation; and, in reference to the latter, in witnessing the influence of an arbitrary association in imposing the most irrational opinions on our fellow-men, our eyes are opened, and we are warned of the danger from the same illusion to ourselves. And as the philosophy of man affords us at once the indication and the remedy of this illusion, so the philosophy of man does this exclusively and alone. Our irrational associations, our habits of groundless credulity and of arbitrary scepticism, find no medicine in the study of aught beyond the domain of mind itself.

As Goethe has well observed, "Mathematics remove no

prejudice; they cannot mitigate obstinacy, or temper party-spirit;" in a word, as to any moral influence upon the mind, they are absolutely null. Hence we may well explain the aversion of Socrates for these studies, if carried beyond a very limited extent.

The Representative Faculty, or Imagination Proper.

The next faculty in order is the Representative, or Imagination Proper, which consists in the greater or less power of holding up an ideal object in the light of consciousness. The energy of Representation, though dependent on Retention and Reproduction, is not to be identified with these operations. For though these three functions (I mean Retention, Reproduction, and Representation) immediately suppose, and are immediately dependent on each other, they are still manifestly discriminated as different qualities of mind, inasmuch as they stand to each other in no determinate proportion. We find, for example, in some individuals the capacity of Retention strong, but the Reproductive and Representative Faculties sluggish and weak. In others, again, the Conservative tenacity is feeble, but the Reproductive and Representative energies prompt and vivid; while in others the power of Reproduction may be vigorous, but what is recalled is never pictured in a clear and distinct consciousness. It will be generally, indeed, admitted, that a strong retentive memory does not infer a prompt recollection; and still more that a strong memory and a prompt recollection do not infer a vivid imagination. These, therefore, though variously confounded by philosophers, we are warranted, I think, in viewing as elementary qualities of mind, which ought to be theoretically distinguished. Limiting, therefore, the term *Imagination* to the mere Faculty of Representing in a more or less vivacious

manner an ideal object,—this Faculty is the source of errors which I shall comprise in the following paragraph.

¶ XII. Imagination, or the Faculty of Representing with more or less vivacity a recalled object of cognition, is the source of Errors, both when it is too languid and when it is too vigorous. In the former case, the object is respresented obscurely and indistinctly; in the latter, the ideal representation affords the illusive appearance of a sensible presentation.

Par. XII. 4. Imagination,—as a source of Error.

A strong imagination, that is, the power of holding up any ideal object to the mind in clear and steady colors, is a faculty necessary to the poet and to the artist; but not to them alone. It is almost equally requisite for the successful cultivation of every scientific pursuit; and, though differently applied, and different in the character of its representation, it may well be doubted whether Aristotle did not possess as powerful an imagination as Homer. The vigor and perfection of this faculty is seen, not so much in the representation of individual objects and fragmentary sciences, as in the representation of systems. In the better ages of antiquity the perfection, the beauty, of all works of taste, whether in Poetry, Eloquence, Sculpture, Painting, or Music, was principally estimated from the symmetry or proportion of all the parts to each other, and to the whole which they together constituted; and it was only in subservience to this general harmony that the beauty of the several parts was appreciated. In the criticism of modern times, on the contrary, the reverse is true; and we are disposed to look more to the obtrusive

Explication. Necessity of Imagination in scientific pursuits.

Diverse characteristics of art in ancient and modern times.

qualities of details, than to the keeping and unison of a whole. Our works of art are, in general, like kinds of assorted patch-work;—not systems of parts all subdued in conformity to one ideal totality, but coördinations of independent fragments, among which a "*purpureus pannus*" seldom comes amiss. The reason of this difference in taste seems to be, what at first sight may seem the reverse, that in antiquity not the Reason but the Imagination was the more vigorous;—that the Imagination was able to represent simultaneously a more comprehensive system; and thus the several parts being regarded and valued only as conducive to the general result,—these parts never obtained that individual importance, which would have fallen to them had they been only created and only considered for themselves. Now this power of representing to the mind a complex system in all its bearings, is not less requisite to the philosopher than to the poet, though the representation be different in kind; and the nature of the philosophic representations, as not concrete and palpable like the poetical, supposes a more arduous operation, and, therefore, even a more vigorous faculty. But Imagination, in the one case and in the other, requires in proportion to its own power a powerful intellect; for imagination is not poetry nor philosophy, but only the condition of the one and of the other.

But to speak now of the Errors which arise from the disproportion between the Imagination and the Judgment; they originate either in the weakness, or in the inordinate strength, of the former.

Errors which arise from the disproportion between Imagination and Judgment.

Those arising from the weakness of Imagination.

In regard to the errors which arise from the imbecility of the Representative Faculty, it is not difficult to conceive how this imbecility

may become a cause of erroneous judgment. The Elaborative Faculty, in order to judge, requires an object, —requires certain differences to be given. Now, if the imagination be weak and languid, the objects represented by it will be given in such confusion and obscurity, that their differences are either null or evanescent, and judgment thus rendered either impossible, or possible only with the probability of error. In these circumstances, to secure itself from failure, the intellect must not attempt to rise above the actual presentations of sense; it must not attempt any ideal analysis or synthesis,—it must abandon all free and self-active elaboration, and all hope of a successful cultivation of knowledge.

From its disproportionate vivacity.

Again, in regard to the opposite errors, those arising from the disproportioned vivacity of imagination, —these are equally apparent. In this case the renewed or newly-modified representations make an equal impression on the mind as the original presentations, and are, consequently, liable to be mistaken for these. Even during the perception of real objects, a too lively imagination mingles itself with the observation, which it thus corrupts and falsifies. Thus arises what is logically called the *vitium subreptionis*. This is frequently seen in those pretended observations made by theorists in support of their hypotheses, in which, if even the possibility be left for imagination to interfere, imagination is sure to fill up all that the senses may leave vacant. In this case the observers are at once dupes and deceivers, in the words of Tacitus, "*Fingunt simul creduntque.*"

In regard to the remedies for these defects of the Representative Faculty;—in the former case, the only alleviation that can be proposed for a feeble imagination, is to

animate it by the contemplation and study of those works of art which are the products of a strong Phantasy, and which tend to awaken in the student a corresponding energy of that faculty. On the other hand, a too powerful imagination is to be quelled and regulated by abstract thinking, and the study of philosophical, perhaps of mathematical, science.

Remedies for these defects of the Imagination.

The faculty which next follows, is the Elaborative Faculty, Comparison, or the Faculty of Relations. This is the Understanding, in its three functions of Conception, Judgment, and Reasoning. On this faculty take the following paragraph.

¶ XIII. The Affections and the Lower Cognitive Faculties afford the sources and occasions of error; but it is the Elaborative Faculty, Understanding, Comparison, or Judgment, which truly errs. This faculty does not, however, err from strength or over-activity, but from inaction; and this inaction arises either from natural weakness, from want of exercise, or from the impotence of attention.

Par. XIII. 5. Elaborative Faculty,—as a source of Error.

I formerly observed that error does not lie in the conditions of our higher faculties themselves, and that these faculties are not, by their own laws, determined to false judgments or conclusions:

Explication.

Error does not lie in the conditions of our Higher Faculties, but is possible in the application of the laws of those faculties to determinate cases.

"*Nam neque decipitur ratio, nec decipit unquam.*"

If these were otherwise, all knowledge would be impossible,—the root of our nature would be a lie. "But in the application of the laws

of our higher faculties to determinate cases, many errors are possible; and these errors may actually be occasioned by a variety of circumstances. Thus, it is a law of our intelligence, that no event, no phenomenon, can be thought as absolutely beginning to be; we cannot but think that all its constituent elements had a virtual existence prior to their concurrence, to necessitate its manifestation to us; we are thus unable to accord to it more than a relative commencement, in other words, we are constrained to look upon it as the effect of antecedent causes. Now though the law itself of our intelligence—that a cause there is for every event—be altogether exempt from error, yet in the application of this law to individual cases, that is, in the attribution of determinate causes to determinate effects, we are easily liable to go wrong. For we do not know, except from experience and induction, what particular antecedents are the causes of particular consequents; and if our knowledge of this relation be imperfectly generalized, or if we extend it by a false analogy to cases not included within our observation, error is the inevitable consequence. But in all this there is no fault, no failure, of intelligence, there is only a deficiency,—a deficiency in the activity of intelligence, while the Will determines us to a decision before the Understanding has become fully conscious of certainty. The defective action of the Understanding may arise from three causes. In the first place, the Faculty of Judgment may by nature be too feeble. This is the case in idiots and weak persons. In the second place, though not by nature incompetent to judge, the intellect may be without the necessary experience,—may not possess the grounds on which a correct

Defective action of the Understanding may arise from three causes.

(*a*) Natural feebleness. (*b*) Want of necessary experience. (*c*) Incompetency of attention.

judgment must be founded. In the third place,—and this is the most frequent cause of error,—the failure of the understanding is from the incompetency of that act of will which is called *Attention*. Attention is the voluntary direction of the mind upon an object, with the intention of fully apprehending it. The cognitive energy is thus, as it were, concentrated upon a single point. We, therefore, say that the mind collects itself, when it begins to be attentive; on the contrary, that it is distracted, when its attention is not turned upon an object as it ought to be. This fixing—this concentration, of the mind upon an object can only be carried to a certain degree, and continued for a certain time. This degree and this continuance are both dependent upon bodily circumstances; and they are also frequently interrupted or suspended by the intrusion of certain collateral objects, which are forced upon the mind, either from without, by a strong and sudden impression upon the senses, or from within, through the influence of Association; and these, when once obtruded, gradually or at once divert the attention from the original and principal object. If we are not sufficiently attentive, or if the effort which accompanies the concentration of the mind upon a single object be irksome, there arises hurry and thoughtlessness in judging, inasmuch as we judge either before we have fully sought out the grounds on which our decision ought to proceed, or have competently examined their validity and effect. It is hence manifest that a multitude of errors is the inevitable consequence.

In regard to the Regulative Faculty,—Common Sense,—Intelligence,—νοῦς,—this is not in itself a source of error. Errors may, however, arise either from overlooking the laws or necessary principles which it does contain; or by attributing to it, as necessary and original data, what are

only contingent generalizations from experience, and, consequently, make no part of its complement of native truths. But these errors, it is evident, are not to be attributed to the Regulating Faculty itself, which is only a place or source of principles, but to the imperfect operations of the Understanding and Self-consciousness, in not properly observing and sifting the phenomena which it reveals.

6. Regulative Faculty,—not properly a source of Error.

Besides these sources of Error, which immediately originate in the several powers and faculties of mind, there are others of a remoter origin arising from the different habits which are determined by the differences of sex, of age, of bodily constitution, of education, of rank, of fortune, of profession, of intellectual pursuit. Of these, however, it is impossible at present to attempt an analysis; and I shall only endeavor to afford you a few specimens, and to refer you for information in regard to the others to the best sources.

Remote sources of Error in the different habits determinated by sex, age, bodily constitution, education, etc.

Intellectual pursuits or favorite studies, inasmuch as these determine the mind to a one-sided cultivation, that is, to the neglect of some, and to the disproportioned development of other, of its faculties, are among the most remarkable causes of error. This partial or one-sided cultivation is exemplified in three different phases. The first of these is shown in the exclusive cultivation of the powers of Observation, to the neglect of the higher faculties of the Understanding. Of this type are your men of physical science. In this department of

Selected examples of these.

A one-sided cultivation of the intellectual powers.

This exemplified in three different phases. Exclusive cultivation. 1. Of the powers of Observation.

knowledge there is chiefly demanded a patient habit of attention to details, in order to detect phenomena, and, these discovered, their generalization is usually so easy that there is little exercise afforded to the higher energies of Judgment and Reasoning. It was Bacon's boast, that Induction, as applied to nature, would equalize all talents, level the aristocracy of genius, accomplish marvels by coöperation and method, and leave little to be done by the force of individual intellects. This boast has been fulfilled. Science has, by the Inductive Process, been brought down to minds, who previously would have been incompetent for its cultivation, and physical knowledge now usefully occupies many who would otherwise have been without any rational pursuit. But the exclusive devotion to such studies, if not combined with higher and graver speculations, tends to wean the student from the more vigorous efforts of mind, which, though unamusing and even irksome at the commencement, tend, however, to invigorate his nobler powers, and to prepare him for the final fruition of the highest happiness of his intellectual nature.

2. Of Metaphysics.
3. Of Mathematics.
Stewart referred to.

A partial cultivation of the intellect, opposite to this, is given in the exclusive cultivation of Metaphysics and of Mathematics. On this subject I may refer you to some observations of Mr. Stewart, in two chapters entitled *The Metaphysician*, and *The Mathematician*, in the third volume of his *Elements of the Philosophy of the Human Mind*,—chapters distinguished equally by their candor and their depth of observation. On this subject Mr. Stewart's authority is of the highest, inasmuch as he was distinguished in both the departments of knowledge, the tendency of which he so well develops.

LECTURE V.—MODIFIED STOICHEIOLOGY.

SECTION II.—ERROR—ITS CAUSES AND REMEDIES.

C.—LANGUAGE.—D.—OBJECTS OF KNOWLEDGE.

In my last Lecture, I concluded the survey of the Errors which have their origin in the conditions and circumstances of the several Cognitive Faculties, and now proceed to that source of false judgment which lies in the imperfection of the Instrument of thought and Communication,—I mean Language.

III. Language,—as a source of Error.

Much controversy has arisen in regard to the question,—Has man invented Language? But the differences of opinion have in a great measure arisen from the ambiguity or complexity of the terms, in which the problem has been stated. By *language* we may mean either the power which man possesses of associating his thought with signs, or the particular systems of signs with which different portions of mankind have actually so associated their thoughts.

Has man invented Language? Ambiguity of the question.

Taking *language* in the former sense, it is a natural faculty, an original tendency of mind, and, in this view, man has no more invented language than he has invented thought. In fact, the power of thought and the power of language are equally entitled to be considered as elementary qualities of intelligence; for while they are so different that they cannot be identified, they are still so reciprocally necessary that the one cannot exist without the other. It is true, indeed, that presentations and representations of given individual objects might have taken place, although there were no signs with which they were mentally connected, and by which they could be overtly expressed; but all complex and factitious constructions out of these given individual objects, in other words, all notions, concepts, general ideas, or thoughts proper, would have been impossible without an association to certain signs, by which their scattered elements might be combined in unity, and their vague and evanescent existence obtain a kind of definite and fixed and palpable reality. Speech and cogitation are thus the relative conditions of each other's activity, and both concur to the accomplishment of the same joint result. The Faculty of Thinking—the Faculty of forming General Notions—being given, this necessarily tends to energy, but the energy of thinking depends upon the coäctivity of the Faculty of Speech, which itself tends equally to energy. These faculties,—these tendencies,—these energies, thus coëxist and have alway coëxisted; and the result of their combined action is thought in language, and language in thought. So much for the origin of Language, considered in general as a faculty.

In what sense Language is natural to man.

But, though the Faculty of Speech be natural and necessary, that its manifestations are, to a certain extent, contingent and artificial, is evident from the simple fact, that there are more than a single language actually spoken. It may, therefore, be asked—Was the first language, actually spoken, the invention of man, or an inspiration of the Deity? The latter hypothesis cuts, but does not loose the knot. It declares that ordinary causes and the laws of nature are insufficient to explain the phenomenon, but it does not prove this insufficiency; it thus violates the rule of Parcimony, by postulating a second and hypothetical cause to explain an effect, which it is not shown cannot be accounted for without this violent assumption. The first and greatest difficulty in the question is thus:—It is necessary to think in order to invent a language, and the invention of a language is necessary in order to think; for we cannot think without notions, and notions are only fixed by words. This can only be solved, as I have said, by the natural attraction between thought and speech,—by their secret affinity, which is such that they suggest and, *pari passu*, accompany each other. And in regard to the question,—Why, if speech be a natural faculty, it does not manifest itself like other natural principles in a uniform manner,—it may be answered that the Faculty of Speech is controlled and modified in its exercise by external circumstances, in consequence of which, though its exertion be natural and necessary, and, therefore, identical in all men, the special forms of its exertion are in a great degree, con-

Was the first language, actually spoken, the invention of man, or an inspiration of the Deity?

The latter hypothesis considered.

Difficulty of the question.

ventional and contingent, and, therefore, different among different portions of mankind.

Language has a general and a special character.

Considered on one side, languages are the results of our intelligence and its immutable laws. In consequence of this, they exhibit in their progress and development resemblances and common characters which allow us to compare and to recall them to certain primitive and essential forms,—to evolve a system of Universal Grammar. Considered on another side, each language is the offspring of particular wants, of special circumstances, physical and moral, and of chance. Hence it is that every language has particular forms as it has peculiar words. Language thus bears the impress of human intelligence only in its general outlines. There is, therefore, to be found reason and philosophy in all languages, but we should be wrong in believing that reason and philosophy have, in any language, determined everything. No tongue, how perfect soever it may appear, is a complete and perfect instrument of human thought. From its very conditions every language must be imperfect. The human memory can only compass a limited complement of words, but the data of sense, and still more the combinations of the understanding, are wholly unlimited in number. No language can, therefore, be adequate to the ends for which it exists; all are imperfect, but some are far less incompetent instruments than others.

No language is a perfect instrument of thought.

From what has now been said, you will be prepared to find in Language one of the principal sources of Error; but before I go on to consider the particular modes in which the Imperfections of Language are the causes of false

judgments,—I shall comprise the general doctrine in the following paragraph:

Par. XIV. Language,—as a source of Error.

¶ XIV. As the human mind necessarily requires the aid of signs to elaborate, to fix, and to communicate its notions, and as Articulate Sounds are the species of signs which most effectually afford this aid, Speech is, therefore, an indispensable instrument in the higher functions of thought and knowledge. But as speech is a necessary, but not a perfect, instrument, its imperfection must reäct upon the mind. For the Multitude of Languages, the Difficulty of their Acquisition, their necessary Inadequacy, and the consequent Ambiguity of Words, both singly and in combination,—these are all copious sources of Illusion and Error.

Explication. Signs necessary for the internal operation of Thought.

We have already sufficiently considered the reason why thought is dependent upon some system of signs or symbols both for its internal perfection and external expression. The analyses and syntheses,—the decompositions and compositions,—in a word, the elaborations, performed by the Understanding upon the objects presented by External Perception and Self-Consciousness, and represented by Imagination,—these operations are faint and fugitive, and would have no existence, even for the conscious mind, beyond the moment of present consciousness, were we not able to connect, to ratify, and to fix them, by giving to their parts (which would otherwise immediately fall asunder) a permanent unity, by associating them with a sensible symbol, which we may always recall at pleasure, and which, when recalled, recalls along with it the

characters which concur in constituting a notion or factitious object of intelligence. So far signs are necessary for the internal operation of thought itself. But for the communication of thought from one mind to another, signs are equally indispensable. For in itself thought is known,—thought it is knowable, only to the thinking mind itself; and were we not enabled to connect certain complements of thought to certain sensible symbols, and by their means to suggest in other minds those complements of thought of which we were conscious in ourselves, we should never be able to communicate to others what engaged our interest, and man would remain for man, if an intelligence at all, a mere isolated intelligence.

And for the communication of Thought.

In regard to the question,—What may these sensible symbols be, by which we are to compass such memorable effects,—it is needless to show that mien and gesture, which, to a certain extent, afford a kind of natural expression, are altogether inadequate to the double purpose of thought and communication, which it is here required to accomplish. This double purpose can be effected only by symbols, which express, through intonations of the voice, what is passing in the mind. These vocal intonations are either inarticulate or articulate. The former are mere sounds or cries; and, as such, an expression of the feelings of which the lower animals are also capable. The latter constitute words, and these, as the expression of thoughts or notions, constitute Language Proper or Speech. Speech, as we have said, as the instrument of elaborating, fixing, and communicating our

Intonations of the voice the only adequate sensible symbols of thought and its communication.

These inarticulate and articulate.

The latter constitute Language Proper.

How Language is a source of Error.

thoughts, is a principal mean of knowledge, and even the indispensable condition on which depends the exercise of our higher cognitive faculties. But, at the same time, in consequence of this very dependence of thought upon language, inasmuch as language is itself not perfect, the understanding is not only restrained in its operations, and its higher development, consequently, checked, but many occasions are given of positive error. For, to say nothing of the impediment presented to the free communication of thought by the multitude of tongues into which human language is divided, in consequence of which all speech beyond their mother-tongue is incomprehensible to those who do not make a study of other languages,—even the accurate learning of a single language is attended with such difficulties, that perhaps there never yet has been an individual who was thoroughly acquainted with all the words and modes of verbal combination in any single language,—his mother-tongue even not excepted. But the circumstance of principal importance is, that how copious and expressive soever it may be, no language is competent adequately to denote all possible notions, and all possible relations of notions, and from this necessary poverty of language in all its different degrees, a certain inevitable ambiguity arises, both in the employment of single words and of words in mutual connection.

The ambiguity of words the principal source of error originating in Language.

As this is the principal source of the error originating in Language, it will be proper to be a little more explicit. And here it is expedient to take into account two circumstances, which mutually affect each other. The first is, that as the vocabulary of every language is neces-

Two circumstances under this head, which mutually affect each other.

sarily finite, it is necessarily disproportioned to the multiplicity, not to say infinity, of thought; and the second, that the complement of words in any given language has been always filled up with terms significant of objects and relations of the external world, before the want was experienced of words to express the objects and relations of the internal.

The vocabulary of every language necessarily finite. Consequences of this.

From the first of these circumstances, considered exclusively and by itself, it is manifest that one of two alternatives must take place. Either the words of a language must each designate only a single notion,—a single fasciculus of thought,—the multitude of notions not designated being allowed to perish, never obtaining more than a momentary existence in the mind of the individual; or the words of a language must each be employed to denote a plurality of concepts. In the former case, a small amount of thought would be expressed, but that precisely and without ambiguity; in the latter, a large amount of thought would be expressed, but that vaguely and equivocally. Of these alternatives (each of which has thus its advantages and disadvantages), the latter is the one which has universally been preferred; and, accordingly, all languages by the same word express a multitude of thoughts, more or less differing from each other. Now, what is the consequence of this? It is plain that if a word has more than a single meaning attached to it, when it is employed it cannot of itself directly and peremptorily suggest any definite thought;—all that it can do is vaguely and hypothetically to suggest a variety of different notions; and we are obliged from the consideration of the context,—of the tenor,—of the general analogy, of the discourse, to surmise,

with greater or less assurance, with greater or less precision, what particular bundle of characters it was intended to convey. Words, in fact, as languages are constituted, do nothing more than suggest, are nothing more than hints; hints, likewise, which leave the principal part of the process of interpretation to be performed by the mind of the hearer. In this respect, the effect of words resembles the effect of an outline or shade of a countenance with which we are familiar. In both cases, the mind is stimulated to fill up what is only hinted or pointed at. Thus it is that the function of language is not so much to infuse knowledge from one intelligence to another, as to bring two minds into the same train of thinking, and to confine them to the same track. In this procedure what is chiefly wonderful, is the rapidity with which the mind compares the word with its correlations, and in general, without the slightest effort, decides which among its various meanings is the one which it is here intended to convey. But how marvellous soever be the ease and velocity of this process of selection, it cannot always be performed with equal certainty. Words are often employed with a plurality of meanings; several of which may quadrate, or be supposed to quadrate, with the general tenor of the discourse. Error is thus possible; and it is also probable, if we have any prepossession in favor of one interpretation rather than of another. So copious a source of error is the ambiguity of language, that a very large proportion of human controversy has been concerning the sense in which certain terms should be understood; and many disputes have even been fiercely waged, in consequence of the disputants being unaware that they agreed in opinion, and only differed in the meaning they attached

Words are merely hints to the mind.

to the words in which that opinion was expressed. On this subject I may refer you to the very amusing and very instructive treatise of Werenfelsius, entitled *De Logomachiis Eruditorum.*

Remedy for error arising from Language.

In regard to a remedy for this description of error,—this lies exclusively in a thorough study of the language employed in the communication of knowledge, and in an acquaintance with the rules of Criticism and Interpretation. The study of languages, when rationally pursued, is not so unimportant as many fondly conceive; for misconceptions most frequently arise solely from an ignorance of words; and every language may, in a certain sort, be viewed as a commentary upon Logic, inasmuch as every language, in like manner, mirrors in itself the laws of thought.

In reference to the rules of Criticism and Interpretation, —these especially should be familiar to those who make a study of the writings of ancient authors, as these writings have descended to us often in a very mutilated state, and are composed in languages which are now dead. How many theological errors, for example, have only arisen because the divines were either ignorant of the principles of Criticism and Hermeneutic, or did not properly apply them! Doctrines originating in a corrupted lection, or in a figurative expression, have thus arisen and been keenly defended. Such errors are best combated by philological weapons; for these pull them up along with their roots.

A thorough knowledge of languages in general accustoms the mind not to remain satisfied with the husk, but to penetrate in, even to the kernel. With this knowledge we shall not so easily imagine that we understand a system,

when we only possess the language in which it is expressed; we shall not conceive that we truly reason, when we only employ certain empty words and formulæ; we shall not betray ourselves into unusual and obscure expressions, under which our meaning may be easily mistaken; finally, we shall not dispute with others about words, when we are in fact at one with them in regard to things. So much for the errors which originate in Language.

IV. Source of Error, —the Objects of our Knowledge.

As to the last source of Error which I enumerated,—the Objects themselves of our knowledge,—it is hardly necessary to say anything. It is evident that some matters are obscure and abstruse, while others are clear and palpable; and that, consequently, the probability of error is greater in some studies than it is in others. But as it is impossible to deliver any special rules for these cases, different from those which are given for the Acquisition of Knowledge in general, concerning which we are soon to speak,—this source of error may be, therefore, passed over in silence.

We have now thus finished the consideration of the various Sources of Error, and—

Par. XV. Rules touching the Causes and Remedies of our False Judgments.

¶ XV. The following rules may be given, as the results of the foregoing discussion, touching the Causes and Remedies of our False Judgments.

1°, Endeavor as far as possible to obtain a clear and thorough insight into the laws of the Understanding, and of the Mental Faculties in general. Study Logic and Psychology.

2°, Assiduously exercise your mind in the application of these laws. Learn to think methodically.

3°, Concentrate your attention in the act of Thinking; and principally employ the seasons when the Intellect is alert, the Passions slumbering, and no external causes of distraction at work.

4°, Carefully eliminate all foreign interests from the objects of your enquiry, and allow yourselves to be actuated by the interest of Truth alone.

5°, Contrast your various convictions, your past and present judgments, with each other; and admit no conclusion as certain, until it has been once and again thoroughly examined, and its correctness ascertained.

6°, Collate your own persuasions with those of others; attentively listen to and weigh, without prepossession, the judgments formed by others of the opinions which you yourselves maintain.

LECTURE VI.—MODIFIED METHODOLOGY.

SECTION I.—OF THE ACQUISITION OF KNOWLEDGE.

I. EXPERIENCE.—A. PERSONAL:—OBSERVATION—INDUCTION AND ANALOGY.

Means by which our knowledge obtains the character of Perfection, viz., the Acquisition and the Communication of Knowledge.

In our last Lecture, having concluded the Second Department of Concrete Logic,—that which treats of the Causes of Error, we now enter upon the Third part of Concrete or Modified Logic,—that which considers the Means by which our Knowledge obtains the character of Perfection. These means may, in general, be regarded as two,—the Acquisition and the Communication of knowledge,—and these two means we shall, accordingly, consider consecutively and apart.

The acquisition of Knowledge.

In regard to the Acquisition of Knowledge,—we must consider this by reference to the different kinds of knowledge of which the human intellect is capable. And this, viewed in its greatest universality, is of two species.

Human Knowledge of two kinds.

Human knowledge, I say, viewed in its greatest universality, is of two kinds. For either it is one of which the objects are given as contingent phænomena, or one in which the objects are given as necessary facts or laws. In the former

case, the cognitions are called *empirical, experiential*, or *of experience ;* in the latter, *pure, intuitive, rational*, or *of reason*, also *of common sense.* These two kinds of knowledge are, likewise, severally denominated *cognitions a posteriori* and *cognitions a priori.* The distinction of these two species of cognitions consists properly in this,—that the former are solely derived from the Presentations of Sense, External and Internal ; whereas the latter, though first manifested on the occasion of such Presentations, are not, however, mere products of Sense ; on the contrary, they are laws, principles, forms, notions, or by whatever name they may be called, native and original to the mind, that is, founded in, or constituting the very nature of, Intelligence ; and, accordingly, out of the mind itself they must be developed, and not sought for and acquired as foreign and accidental acquisitions. As the Presentative Faculties inform us only of what exists and what happens, that is, only of facts and events,—such empirical knowledge constitutes no necessary and universal judgment ; all, in this case, is contingent and particular, for even our generalized knowledge has only a relative and precarious universality. The cognitions, on the other hand, which are given as Laws of Mind, are, at once and in themselves, universal and necessary. We cannot but think them, if we think at all. The doctrine, therefore, of the Acquisition of Knowledge, must consist of two parts,—the first treating of the acquisition of knowledge through the data of experience, the second, of the acquisition of knowledge through the data of Intelligence.

Doctrine of the Acquisition of Knowledge consists of two parts.

I. The doctrine of Experience. Experience of two kinds,

In regard to the first of these sources, viz., Experience,—this is either our own experience or the experience of others, and in either case it is for us a mean of knowledge. It is manifest that the knowledge we acquire through our personal experience, is far superior in degree to that which we obtain through the experience of other men; inasmuch as our knowledge of an object, in the former case, is far clearer and more distinct, far more complete and lively, than in the latter; while at the same time the latter also affords us a far inferior conviction of the correctness and certainty of the cognition than the former. On the other hand, foreign is far superior to our proper experience in this,—that it is much more comprehensive, and that, without this, man would be deprived of those branches of knowledge which are to him of the most indispensable importance. Now, as the principal distinction of experience is thus into our own experience and into the experience of others, we must consider it more closely in this two-fold relation. First, then, of our Personal Experience.

1. Personal Experience.

Experience necessarily supposes, as its primary condition, certain presentations by the faculties of External or of Internal Perception, and is, therefore, of two kinds, according as it is conversant about the objects of the one of these faculties, or the objects of the other. But the presentation of a fact of the external or of the internal world is not at once an experience. To this there is required a continued series of such presentations, a comparison of these together, a mental separation of the different, a mental combination of the similar, and it, therefore, over and above the operation of the Presenta-

tive Faculties, requires the coöperation of the Retentive, the Reproductive, the Representative, and the Elaborative Faculties. In regard to Experience, as the first means by which we acquire knowledge through the legitimate use and application of our Cognitive Faculties, I give you the following paragraph:

¶ XVI. The First Mean towards the Acquisition of Knowledge is *Experience* (*experientia*, ἐμπειρία). Experience may be, rudely and generally, described as the apprehension of the phænomena of the outer world, presented by the Faculty of External Perception, and of the phænomena of the inner world, presented by the Faculty of Self-consciousness;—these phænomena being retained in Memory, ready for Reproduction and Representation, being also arranged into order by the Understanding.

Par. XVI. Experience; what,—in general.

This paragraph, you will remark, affords only a preliminary view of the general conditions of Experience. In the first place, it is evident, that without the Presentative, or, as they may with equal propriety be called, the Acquisitive, Faculties of Perception, External and Internal, no experience would be possible. But these faculties, though affording the fundamental condition of knowledge, do not of themselves make up experience. There is, moreover, required of the phænomena or appearances the accumulation and retention, the reproduction and representation. Memory, Reminiscence, and Imagination must, therefore, also coöperate. Finally, unless the phænomena be compared together, and be arranged into classes, according to their similarities and differences, it is evident that no judgments,—no conclusions,

Explication.

can be formed concerning them; but without a judgment knowledge is impossible; and as experience is a knowledge, consequently experience is impossible. The Understanding or Elaborative Faculty must, therefore, likewise coöperate. Manilius has well expressed the nature of experience in the following lines.

> "*Per varios usus artem experientia fecit,*
> *Exemplo monstrante viam.*"

And Afranius in the others:

> "*Usus me genuit, mater peperit Memoria;*
> *Sophiam vocant me Graii, vos Sapientiam.*"

Common and Scientific Experience.

Our own observation, be it external or internal, is either with, or without, intention; and it consists either of a series of Presentations alone, or Abstraction and Reflection supervene, so that the presentations obtain that completion and system which they do not of themselves possess. In the former case, the experience may be called an *Unlearned* or *Common;* in the latter, a *Learned* or *Scientific Experience.* Intentional and reflective experience is called *Observation.*

Observation—what. Of two kinds,—Observation Proper, and Experiment.

Observation is of two kinds; for either the objects which it considers remain unchanged, or, previous to its application, they are made to undergo certain arbitrary changes, or are placed in certain factitious relations. In the latter case, the observation contains the specific name of *Experiment.* Observation and experiment do not, therefore, constitute opposite or two different procedures,—the latter is, in propriety, only a certain subordinate modification of the former; for, while observation may accomplish its end without experiment, ex-

periment without observation is impossible. Observation and experiment are manifestly exclusively competent upon the objects of our empirical knowledge; and they coöperate, equally and in like manner, to the progress of that knowledge, partly by establishing, partly by correcting, partly by amplifying it. Under observation, therefore, is not to be understood a common or unlearned experience, which obtrudes itself upon every one endowed with the ordinary faculties of Sense and Understanding, but an intentional and continued application of the faculties of Perception, combined with an abstractive and reflective attention to an object or class of objects, a more accurate knowledge of which, it is proposed, by the observation, to accomplish. But in order that the observation should accomplish this end,—more especially when the objects are numerous and a systematic complement of cognitions is the end proposed,—

Præcognita of Observation.

it is necessary that we should know certain præcognita,—1°, What we ought to observe; 2°, How we ought to observe; and 3°, By what means are the data of observation to be reduced to system. The first of these concerns the Object; the second, the Procedure; the third, the scientific Completion of the observations. It is proper to make some general observations in regard to these, in their order; and first, of the Object of observation,—the *what* we ought to observe.

First,—The Object of Observation. This fourfold.

The Object of Observation can only be some given and determined phænomenon, and this phænomenon either an external or an internal. Through observation, whether external or internal, there are four several cognitions which we propose to compass, viz., to ascertain—1°, What

the Phænomena themselves are; 2°, What are the Conditions of their Reality; 3°, What are the Causes of their Existence; 4°, What is the Order of their Consecution.

1°, What the Phænomena are.

In regard to what the phænomena themselves are *(quid sint)*, that is, in regard to what constitutes their peculiar nature,—this, it is evident, must be the primary matter of consideration, it being always supposed that the fact (the *an sit)* of the phænomenon itself has been established. To this there is required, above all, a clear and distinct Presentation or Representation of the object. In order to obtain this, it behooves us to analyze,—to dismember,—the constituent parts of the object, and to take into proximate account those characters which constitute the object, that is, which make it to be what it is, and nothing but what it is. This being performed, we must proceed to compare it with other objects, and with those especially which bear to it the strongest similarity, taking accurate note always of those points in which they reciprocally resemble and in which they reciprocally disagree.

In their individual peculiarities and contrasts.

As under determinate genera and species.

But it is not enough to consider the several phænomena in their individual peculiarities and contrasts,—in what they are, and in what they are not,—it is also requisite to bring them under determinate genera and species. To this end we must, having obtained (as previously prescribed) a clear and distinct knowledge of the several phænomena in their essential similarities and differences, look away or abstract from the latter,—the differences, and comprehend the former,—the similarities, in a compendious and characteristic notion, under an appropriate name.

When the distinctive peculiarities of the phænomena have been thus definitely recognized, the second question emerges,—What are the Conditions of their Reality. These conditions are commonly called *Requisites*, and under *requisite* we must understand all that must have preceded, before the phænomena could follow. In order to discover the requisites, we take a number of analogous cases, or cases similar in kind, and inquire what are the circumstances under which the phænomena always arises, if it does arise, and what are the circumstances under which it never arises; and then, after a competent observation of individual cases, we construct the general judgment, that the phænomenon never occurs unless this or that other phænomenon has preceded, or at least accompanied, it. Here, however, it must be noticed, that nothing can be viewed as a requisite which admits of any, even the smallest, exception.

2°, What the Conditions of their Reality.

The requisite conditions being discovered, the third question arises,—What are the Causes of the Phænomena. According to the current doctrine, the *causes* of phænomena are not to be confounded with their *requisites;* for although a phænomenon no more occurs without its requisite than without its cause, still, the requisite being given, the phænomenon does not necessarily follow, and, indeed, very frequently does not ensue. On the contrary, if the cause occurs, the phænomenon must occur also. In other words, the requisite or condition is that without which the phænomenon never is; the cause, on the other hand, is that through which it always is. Thus an emotion of pity never arises without a knowledge of the misfortune of another; but so little does this knowledge necessitate that emotion,

3°, What the Causes of the Phænomena.

that its opposite, a feeling of rejoicing, complacency, at such suffering may ensue; whereas the knowledge of another's misfortune must be followed by a sentiment of pity, if we are predisposed in favor of the person to whom the misfortune has occurred. In this view, the knowledge of another's misfortune is only a requisite; whereas our favorable predisposition constitutes the cause. It must, however, be admitted, that in different relations one and the same circumstance may be both requisite and cause; and, in point of fact, it would be more correct to consider the cause as the whole sum of antecedents, without which the phænomenon never does take place, and with which it always must. What are commonly called *requisites*, are thus, in truth, only partial causes; what are called *causes*, only proximate requisites.

4°, What the Order of their Consecution.

In the fourth place, having ascertained the essential qualities,—the Conditions and the Causes of phænomena,—a final question emerges,—What is the Order in which they are manifested? and this being ascertained, the observation has accomplished its end. This question applies either to a phænomenon considered in itself, or to a phænomenon considered in relation to others. In relation to itself, the question concerns only the time of its origin, of its continuance, and of its termination; in relation to others, it concerns the reciprocal consecution in which the several phænomena appear.

Second,—The Manner of Observation.

We now go on to the second Præcognitum,—the Manner of Observation,—How we are to observe. What we have hitherto spoken of—the Object—can be known only in one way,—the way of Scientific Observation. It therefore remains to

be asked,—How must the observation be instituted, so as to afford us a satisfactory result in regard to all the four sides on which it behooves an object to be observed? In the first place, as preliminary to observation, it is required that the observing mind be tranquil and composed, be exempt from prejudice, partiality, and prepossession, and be actuated by no other interest than the discovery of truth. Tranquility and composure of mind are of peculiar importance in our observation of the phænomena of the internal world; for these phænomena are not, like those of the external, perceptible by sense, enclosed in space, continuous and divisible; and they follow each other in such numbers, and with such a rapidity, that they are at best observable with difficulty, often losing even their existence by the interference of the observing,—the reflective energy, itself. But that the observation should be always conducted in the calm and collected state of mind required to purify this condition, we must be careful to obtain, more and more, a mastery over the Attention, so as to turn it with full force upon a single aspect of the phænomena, and, consequently, to abstract it altogether from every other. Its proper function is to contemplate the objects of observation tranquilly, continuously, and without anxiety for the result; and this, likewise, without too intense an activity or too vigorous an application of its forces. But the observation and concomitant energy of attention will be without result, unless we previously well consider what precise object or objects we are now to observe. Nor will our experience obtain an answer to the question proposed for it to solve, unless that question be of such a nature as will animate the observing faculties by some stimulus, and give them a

1°, Proper state of the observing mind.

determinate direction. Where this is not the case, attention does not effect anything, nay, it does not operate at all. On this account such psychological questions as the following: What takes place in the process of Self-consciousness,—of Perception,—of Vision,—of Hearing,—of Imagination, etc.,—cannot be answered, as thus absolutely stated, that is, without reference to some determinate object. But if I propose the problem,—What takes place when I see this or that object, or better still, when I see this table,—the attention is stimulated and directed, and even a child can give responses, which, if properly illustrated and explained, will afford a solution to the problem. If, therefore, the question upon the object of observation be too vague and general, so that the attention is not suitably excited and applied,—this question must be divided and subdivided into others more particular, and this process must be continued until we reach a question which affords the requisite conditions. We should, therefore, determine as closely as possible the object itself, and the phases in which we wish to observe it, separate from it all foreign or adventitious parts, resolve every question into its constituent elements, enunciate each of these as specially as possible, and never couch it in vague and general expressions. But here we must at the same time take care that the object be not so torn and mangled that the attention feels no longer any attraction to the several parts, or that the several parts can no longer be viewed in their natural connection. So much it is possible to say in general, touching the Manner in which observation ought to be carried on; what may further be added under this head, depends upon the particular nature of the objects to be observed.

2°, Conditions of the question to be determined by the observation.

In this manner, then, must we proceed, until all has been accomplished which the problem, to be answered by the observation, pointed out. When the observation is concluded, an accurate record or notation of what has been observed is of use, in order to enable us to supply what is found wanting in our subsequent observation. If we have accumulated a considerable apparatus of results, in relation to the object we observe, it is proper to take a survey of these; from what is found defective, new questions must be evolved, and an answer to these sought out through new observations. When the inquiry has attained its issue, a tabular view of all the observations made upon the subject is convenient, to afford a conspectus of the whole, and as an aid to the memory. But how (and this is the Third Precognition) individual observations are to be built up into a systematic whole, is to be sought for partly from the nature of science in general, partly from the nature of the particular empirical science for the constitution of which the observation is applied. Nor is what is thus sought difficult to find. It is at once evident, that a synthetic arrangement is least applicable in the empirical sciences. For, anterior to observation, the object is absolutely unknown; and it is only through observation that it becomes a matter of science. We can, therefore, only go to work in a problematic or interrogative manner, and it is impossible to commence by assertory propositions, of which we afterwards lead the demonstration. We must, therefore, determine the objects on all sides, in so far as observation is competent to this; we must analyze every question into its subordinate questions, and each of these must find its answer in observation. The systematic order is thus given

Third,—The means by which the data of Observation are to be reduced to system.

naturally and of itself; and in this procedure it is impossible that it should not be given. But for a comprehensive and all-sided system of empirical knowledge, it is not sufficient to possess the whole data of observation, to have collected these together, and to have arranged them according to some external principle; it is, likewise, requisite that we have a thorough-going principle of explanation, even though this explanation be impossible in the way of observation, and a power of judging of the data, according to universal laws, although these universal laws may not be discovered by experience alone. These two ends are accomplished by different means. The former we compass by the aid of Hypothesis, the latter, by the aid of Induction and Analogy. Of these in detail. In regard to Hypothesis, I give you the following paragraph.

¶ XVII. When a phænomenon is presented, which can be explained by no principle afforded through Experience, we feel discontented and uneasy; and there arises an effort to discover some cause which may, at least provisorily, account for the outstanding phænomenon; and this cause is finally recognized as valid and true, if, through it, the given phænomenon is found to obtain a full and perfect explanation. The judgment in which a phænomenon is referred to such a problematic cause, is called an *Hypothesis.*

Par. XVII. Hypothesis,—what.

Hypotheses have thus no other end than to satisfy the desire of the mind to reduce the objects of its knowledge to unity and system; and they do this in recalling them, *ad interim,* to some principle, through which the mind is enabled to comprehend them. From this view of their

Explication. Hypothesis,—its end.

nature, it is manifest how far they are permissible, and how far they are even useful and expedient; throwing altogether out of account the possibility, that what is at first assumed as hypothetical, may, subsequently, be proved true.

When our experience has revealed to us a certain correspondence among a number of objects, we are determined, by an original principle of our nature, to suppose the existence of a more extensive correspondence than our observation has already proved, or may ever be able to establish. This tendency to generalize our knowledge by the judgment,—that where much has been found accordant, all will be found accordant,—is not properly a conclusion deduced from premises, but an original principle, of our nature, which we may call that of *Logical*, or perhaps better, that of *Philosophical, Presumption*. This Presumption is of two kinds; it is either Induction or Analogy, which, though usually confounded, are, however, to be carefully distinguished. I shall commence the consideration of these by the following paragraph.

Par. XVIII. Induction and Analogy.

¶ XVIII. If we have uniformly observed that a number of objects of the same class (genus or species) possess in common a certain attribute, we are disposed to conclude that this attribute is possessed by all the objects of that class. This conclusion is properly called an *Inference of Induction*. Again, if we have observed that two or more things agree in several internal and essential characters, we are disposed to conclude that they agree, likewise, in all other essential characters, that is, that they are constituents of the same class (genus or species). This conclusion is properly called an *Inference of Analogy*.

The principle by which, in either case, we are disposed to extend our inferences beyond the limits of experience, is a natural or ultimate principle of intelligence; and may be called the principle of *Logical*, or, more properly, of *Philosophical Presumption.*

Explication. Induction and Analogy, — their agreement and difference.

The reasoning by Induction and the reasoning by Analogy have this in common, that they both conclude from something observed to something not observed; from something within to something beyond the sphere of actual experience. They differ, however, in this, that, in Induction, that which is observed and from which the inference is drawn to that which is not observed, is a unity in plurality; whereas, in Analogy, it is a plurality in unity. In other words, in Induction, we look to the one in the many; in Analogy we look to the many in the one; and while in both we conclude to the unity in totality, we do this, in Induction, from the recognized unity in plurality, in Analogy, from the recognized plurality in unity. Thus, as induction rests upon the principle, that what belongs (or does not belong) to many things of the same kind, belongs, (or does not belong) to all things of the same kind; so analogy rests upon the principle,—that things which have many observed attributes in common, have other not observed attributes in common likewise. It is hardly necessary to remark that we are now speaking of Induction and Analogy, not as principles of Pure Logic, and as necessitated by the fundamental laws of thought, but of these as means of acquiring knowledge, and as legitimated by the conditions of objective reality. In Pure Logic, Analogy has no place, and only that Induction is admitted, in which all the several parts are supposed to

legitimate the inference to the whole. Applied Induction, on the contrary, rests on the constancy,—the uniformity of nature, and on the instinctive expectation we have of this stability. This constitutes what has been called the principle of *Logical Presumption*, though perhaps it might, with greater propriety, be called the principle of *Philosophical Presumption*. We shall now consider these severally; and, first, of Induction.

Induction,—what.

An Induction is the enumeration of the parts, in order to legitimate a judgment in regard to the whole. Now, the parts may either be individuals or particulars, strictly so called. I say strictly so called, for you are aware that the term *particular* is very commonly employed, not only to denote the species, as contained under a genus, but, likewise, to denote the individual, as contained under a species. Using, however, the two terms in their proper significations, I say, if the parts are individual or singular things, the induction is then called *Individual;* whereas if the parts be species or subaltern genera, the induction then obtains the name of *Special*. An example of the Individual Induction is given, were we to argue thus,—*Mercury, Venus, the Earth, Mars, etc., are bodies in themselves opaque, and which borrow their light from the sun. But Mercury, Venus, etc., are planets. Therefore, all planets are opaque, and borrow their light from the sun.* An example of the special is given, were we to argue as follows,—*Quadrupeds, birds, fishes, the amphibia, etc., all have a nervous system. But quadrupeds, birds, etc., are animals. Therefore all animals* (though it is not yet detected in some) *have a nervous system.* Now, here it is manifest that Special rests upon Individual Induction,

Of two kinds,—Individual and Special.

and that, in the last result, all induction is individual. For we can assert nothing concerning species, unless what we assert of them has been previously observed in their constituent singulars.

The two conditions of legitimate Induction,—First.

For a legitimate Induction there are requisite at least two conditions. In the first place, it is necessary, That the partial (and this word I use as including both the terms *individual* and *particular,)*—I say, it is necessary that the partial judgments out of which the total or general judgment is inferred, be all of the same quality. For if one even of the partial judgments had an opposite quality, the whole induction would be subverted. Hence it is that we refute universal judgments founded on an imperfect induction, by bringing what is called an instance *(instantia)*, that is, by adducing a thing belonging to the same class or notion, in reference to which the opposite holds true. For example, the general assertion, *All dogs bark*, is refuted by the instance of the dogs of Labrador or California (I forget which),—these do not bark. In like manner, the general assertion, *No quadruped is oviparous*, is refuted by the instance of the *Ornithorhynchus Paradoxus*. But that the universal judgment must have the same quality as the partial, is self-evident; for this judgment is simply the assertion of something to be true of all which is true of many.

Second.

The second condition required is, That a competent number of the partial objects from which the induction departs, should have been observed, for otherwise the comprehension of other objects under the total judgment would be rash. What is the number of such objects, which amounts to a

competent induction, it is not possible to say in general. In some cases, the observation of a very few particular or individual examples is sufficient to warrant an assertion in regard to the whole class; in others, the total judgment is hardly competent, until our observation has gone through each of its constituent parts. This distinction is founded on the difference of essential and unessential characters. If the character be essential to the several objects, a comparatively limited observation is necessary to legitimate our general conclusion. For example, it would require a far less induction to prove that all animals breathe, than to prove that the mamalia, and the mamalia alone, have lateral lobes to the cerebellum. For the one is seen to be a function necessary to animal life; the other, as far as our present knowledge reaches, appears only as an arbitrary concomitant. The difference of essential and accidental is, however, one itself founded on induction, and varies according to the greater or less perfection to which this has been carried. In the progress of science, the lateral lobes of the cerebellum may appear to future physiologists as necessary a condition of the function of suckling their young, as the organs of breathing appear to us of circulation and of life.

Summary of the doctrine of Induction

To sum up the Doctrine of Induction,—"This is more certain, 1°, In proportion to the number and diversity of the objects observed;—2°, In proportion to the accuracy with which the observation and comparison have been conducted;—3°, In proportion as the agreement of the objects is clear and precise;—and, 4°, In proportion as it has been thoroughly explored, whether there exist exceptions or not."

Almost all induction is, however, necessarily imperfect; and Logic can inculcate nothing more important on the

investigators of nature than that sobriety of mind, which regards all its past observations only as hypothetically true, only as relatively complete, and which, consequently, holds the mind open to every new observation, which may correct and limit its former judgments.

Analogy,—what.

So much for Induction; now for Analogy. Analogy, in general, means proportion, or a similarity of relations. Thus, to judge analogically, or according to analogy, is to judge things by the similarity of their relations. Thus, when we judge that as two is to four, so is eight to sixteen, we judge that they are analogically identical; that is, though the sums in other respects are different, they agree in this, that as two is the half of four, so eight is the half of sixteen.

In common language, however, this propriety of the term is not preserved. For *by analogy* is not always meant merely *by proportion*, but frequently *by comparison—by relation*, or simply *by similarity*. In so far as Analogy constitutes a particular kind of reasoning from the individual or particular to the universal, it signifies an inference from the partial similarity of two or more things to their complete or total similarity. For example, — *This disease corresponds in many symptoms with those we have observed in typhus fevers; it will, therefore, correspond in all, that is, it is a typhus fever.*

Has two essential conditions,—First.

Like Induction, Analogy has two essential requisites. In the first place, it is necessary that of two or more things a certain number of attributes should have observed, in order to ground the inference that they also agree in those other attributes, which it has not yet been ascertained that they possess. It is evident that in proportion to the number of

points observed, in which the things compared together coincide, in the same proportion can it be with safety assumed, that there exists a common principle in these things, on which depends the similarity in the points known as in the points unknown.

Second. In the second place, it is required that the predicates already observed should neither be all negative nor all contingent; but that some at least should be positive and necessary. Mere negative characters denote only what the thing is not; and contingent characters need not be present in the thing at all. In regard to negative attributes, the inference, that two things, to which a number of qualities do not belong, and which are, consequently, similar to each other only in a negative point of view,—that these things are, therefore, absolutely and positively similar, is highly improbable. But that the judgment in reference to the compared things (say A and X) must be of the same quality (*i. e.* either both affirmative or both negative), is self-evident. For if it be said A *is* B, X *is not* B, A *is not* C, X *is* C; their harmony or similarity is subverted, and we should rather be warranted in arguing their discord and dissimilarity in other points. And here it is to be noticed that Analogy differs from Induction in this, that it is not limited to one quality, but that it admits of a mixture of both.

In regard to contingent attributes, it is equally manifest that the analogy cannot proceed exclusively upon them. For, if two things coincide in certain accidental attributes (for example, two men in respect of stature, age, and dress,) the supposition that there is a common principle, and a general similiarity founded thereon, is very unlikely.

Summary of the doctrine of Analogy.

To conclude: Analogy is certain in proportion, 1°, To the number of congruent observations; 2°, To the number of congruent characters observed; 3°, To the importance of these characters and their essentiality to the objects; and, 4°, To the certainty that the characters really belong to the objects, and that a partial correspondence exists. Like Induction, Analogy can only pretend at best to a high degree of probability; it may have a high degree of certainty, but it never reaches to necessity.

Induction and Analogy compared together.

Comparing these two processes together: The Analogical is distinguished from the Inductive in this —that Induction regards a single predicate in many subjects as the attribute Z in A, in B, in C, in D, in E, in F, etc.; and as these many belong to one class, say Q; it is inferred that Z will, likewise, be met with in the other things belonging to this class, that is, in all Qs. On the other hand, Analogy regards many attributes in one subject (say *m*, *n*, *o*, *p*, in A); and as these many are in part found in another subject (say *m*, and *n*, in B), it is concluded that, in that second thing, there will also be found the other attributes (say *o* and *p*). Through Induction we, therefore, endeavor to prove that one character belongs (or does not belong) to all the things of a certain class, because it belongs (or does not belong) to many things of that class. Through Analogy on the other hand, we seek to prove that all the characters of a thing belong (or do not belong) to another or several others, because many of these characters belong to this other or these others. In the one it is proclaimed,—*One in many, therefore one in all.*—In the other it is proclaimed,—*Many in one, therefore all in one.*

By these Processes of Induction and Analogy, as observed, we are unable to attain absolute certainty ;—a great probability is all that we can reach, and this for the simple reason, that it is impossible, under any condition, to infer the unobserved from the observed,—the whole from any proportion of the parts,—in the way of any rational necessity. Even from the requisites of Induction and Analogy, it is manifest that they bear the stamp of uncertainty ; inasmuch as they are unable to determine how many objects or how many characters must be observed, in order to draw the conclusion that the case is the same with all the other objects, or with all the other characters. It is possible only in one way to raise Induction and Analogy from mere probability to complete certainty,—viz., to demonstrate that the principles which lie at the root of these processes, and which we have already stated, are either necessary laws of thought, or necessary laws of nature. To demonstrate that they are necessary laws of thought is impossible ; for Logic not only does not allow inference from many to all, but expressly rejects it. Again, to demonstrate that they are necessary laws of nature is equally impossible. This has indeed been attempted, from the uniformity of nature, but in vain. For it is incompetent to evince the necessity of the inference of Induction and Analogy from the fact denominated *the law of nature ;* seeing that this law itself can only be discovered by the way of Induction and Analogy. In this attempted demonstration there is thus the most glaring *petitio principii.* The result which has been previously given remains, therefore, intact :—Induction and Analogy guarantee no perfect certainty, but only a high degree of probability, while all probability rests at best upon Induction and Analogy, and nothing else.

Induction and Analogy do not afford absolute certainty.

LECTURE VII.—MODIFIED METHODOLOGY.

SECTION I.—OF THE ACQUISITION OF KNOWLEDGE.

I. EXPERIENCE—B. FOREIGN:—ORAL TESTIMONY—ITS CREDIBILITY.

Foreign Experience.

HAVING, in our last Lecture, terminated the Doctrine of Empirical Knowledge, considered as obtained Immediately,—that is, through the exercise of our own powers of Observation,—we are now to enter on the doctrine of Empirical Knowledge considered as obtained Mediately,—that is, through the Experience of Other Men. The following paragraph will afford you a general notion of the nature and kinds of this knowledge.

Par. XIX. Testimony.

¶ XIX. A matter of Observation or Empirical Knowledge can only be obtained Mediately, that is, by one individual from another, through an enouncement declaring it to be true. This enouncement is called, in the most extensive sense of the word, a *Witnessing* or *Testimony (testimonium)*; and the person by whom it is made is, in the same sense, called a *Witness*, or *Testifier (testis)*. The object of the testimony is called the *Fact (factum)*; and its validity constitutes what is styled *Historical Credibility (credibilitas historica)*. To estimate this credibility, it is requisite to consider—

1°, The Subjective Trustworthiness of the Witnesses *(fides testium)*, and 2°, The Objective Probability of the Fact itself. The former is founded partly on the Sincerity, and partly on the Competence, of the Witness. The latter depends on the Absolute and Relative Possibility of the Fact itself. Testimony is either Immediate or Mediate. Immediate, where the fact reported is the object of a Personal Experience; Mediate, where the fact reported is the object of a Foreign Experience.

Explication.

It is manifest that Foreign Experience, or the experience of other men, is astricted to the same laws, and its certainty measured by the same criteria, as the experience we carry through ourselves. But the experience of the individual is limited, when compared with the experience of the species; and if men did not possess the means of communicating to each other the results of their several observations,—were they unable to coöperate in accumulating a stock of knowledge, and in carrying on the progress of discovery,—they would never have risen above the very lowest steps in the acquisition of science. But to this mutual communication they are competent; and each individual is thus able to appropriate to his own benefit the experience of his fellow-men, and to confer on them in return the advantages which his own observations may supply. But it is evident that this reciprocal communication of their respective experiences among men, can only be effected inasmuch as one is able to inform another of what he has himself observed, and that the vehicle of this information can only be some enouncement in conventional signs of one character or another. The enouncement of what has been observed is, as stated in the paragraph, called

a witnessing,—a bearing witness,—a testimony, etc., these terms being employed in their wider acceptation; and he by whom this declaration is made, and on whose veracity it rests, is called a *witness*, *voucher*, or *testifier (testis)*. The term *testimony*, I may notice, is sometimes, by an abusive metonym, employed for *witness;* and the word *evidence* is often ambiguously used for *testimony*, and for the bearer of testimony,—*the witness.*

The proper object of Testimony,

Such an enouncement,—such a testimony, is, however, necessary for others, only when the experience which it communicates is beyond the compass of their own observation. Hence it follows, that matters of reasoning are not proper objects of testimony, since matters of reasoning, as such, neither can rest, nor ought to rest, on the observations of others; for a proof of their certainty is equally competent to all, and may by all be obtained in the manner in which it was originally obtained by those who may bear witness to their truth. And hence it further follows, that matters of experience alone are proper objects of testimony; and of matters of experience themselves, such only as are beyond the sphere of our personal experience. Testimony, in the strictest sense of the term, therefore, is the communication of an experience, or, what amounts to the same thing, the report of an observed phænomenon, made to those whose own experience or observation has not reached so far.

The Fact. Historical credibility.

The object of testimony, as stated in the paragraph, is called the *fact;* the validity of a testimony is called *historical credibility.* The testimony is either immediate or mediate. Immediate when the witness has himself observed the fact to which he testifies; mediate, when the

witness has not himself had experience of this fact, but has received it on the testimony of others. The former, the immediate witness, is commonly styled an *eye-witness (testis oculatus)*; and the latter, the mediate witness, an *ear-witness (testis auritas)*. The superiority of immediate to mediate testimony is expressed by Plautus, "*Pluris est oculatus testis unus, quam auriti decem.*" These denominations, *eye* and *ear witness*, are however, as synonyms of *immediate* and *mediate witness*, not always either applicable or correct. The person on whose testimony a fact is mediately reported, is called the *guarantee*, or he on whose authority it rests; and the guarantee himself may be again either an immediate or a mediate witness. In the latter case he is called a *second-hand* or *intermediate witness*; and his testimony is commonly styled *hearsay evidence*. Further, Testimony, whether immediate or mediate, is either *partial* or *complete*; either *consistent* or *contradictory*. These distinctions require no comment. Finally, testimony is either *direct* or *indirect*; direct, when the witness has no motive but that of making known the fact; indirect, when he is actuated to this by other ends.

Eye-witness. Ear-witness.

The Guarantee.

Testimonies,—Partial, Complete, Consistent, Contradictory.

The only question in reference to Testimony is that which regards its Credibility; and the question concerning the credibility of the witness may be comprehended under that touching the Credibility of Testimony. The order I shall follow in the subsequent observations is this,—I shall, in the first place, consider the Credibility of Testimony in general; and,

Division of the subject: I. Credibility of Testimony in general. II. Credibility of Testimony in its particular forms of Immediate and Mediate.

in the second, consider the Credibility of Testimony in its particular forms of Immediate and Mediate.

First, then, in regard to the Credibility of Testimony in general;—When we inquire whether a certain testimony is, or is not, deserving of credit, there are two things to be considered: 1°, The Object of the Testimony, that is, the fact or facts for the truth of which the Testimony vouches; and, 2°, The Subject of the Testimony, that is, the person or persons by whom the testimony is borne. The question, therefore, concerning the Credibility of testimony, thus naturally subdivides itself into two. Of these questions, the first asks, What are the conditions of the credibility of a testimony by reference to what is testified, that is, in relation to the Object of the testimony? The second asks,—What are the conditions of the credibility of a testimony by him who testifies, that is, in relation to the Subject of the testimony? Of these in their order.

I. Credibility of Testimony in general. 1°, The Object of the Testimony. Its absolute Possibility.

On the first question.—"In regard to the matter testified, that is, in regard to the object of the testimony; it is, first of all, a requisite condition, that what is reported to be true should be possible, both absolutely, or as an object of the Elaborative Faculty, and relatively, or as an object of the Presentative Faculties,—Perception, External or Internal. A thing is possible absolutely, or in itself, when it can be construed to thought, that is, when it is not inconsistent with the logical laws of thinking; a thing is relatively possible as an object of Perception, External or Internal, when it can affect Sense or Self-consciousness, and, through such affection, determine its apprehension by one or other of these faculties. A testimony is, therefore, to be unconditionally rejected, if

the fact which it reports be either in itself impossible, or impossible as an object of the Presentative Faculties. But the impossibility of a thing, as an object of these faculties, must be decided either upon physical, or upon metaphysical, principles. A thing is physically impossible as an object of sense, when the existence itself, or its perception by us, is, by the laws of the material world, impossible. It is metaphysically impossible, when the object itself, or its perception, is possible neither through a natural nor through a supernatural, agency. But, to establish the metaphysical impossibility of a thing, it is not sufficient that its existence cannot be explained by the ordinary laws of nature, or even that its existence should appear repugnant with these laws; it is requisite that an universal and immutable law of nature should have been demonstrated to exist, and that this law would be subverted if the fact in question were admitted to be physically possible. In like manner, to constitute the metaphysical impossibility of a thing, it is by no means enough to show that it is not explicable on natural laws, or even that any natural law stands opposed to it; it is further requisite to prove that the intervention even of supernatural agency is incompetent to its production, that its existence would involve the violation of some necessary principle of reason.

Physical and Metaphysical Impossibility.

To establish the credibility of a testimony, in so far as this is regulated by the nature of its object, there is, besides the proof of the absolute possibility of this object, required also a proof of its relative possibility; that is, there must not only be no contradiction between its necessary attributes,—the attributes by which it must be thought,—but no contra-

Relative Possibility of an object.

diction between the attributes actually assigned to it by the testimony. A testimony, therefore, which, *qua* testimony, is self-contradictory, can lay no claim to credibility; for what is self-contradictory is logically suicidal. And here the only question is,—Does the testimony, *qua* testimony, contradict itself? for if the repugnancy arise from an opinion of the witness, apart from which the testimony as such would still stand undisproved, in that case the testimony is not at once to be repudiated as false. For example, it would be wrong to reject a testimony to the existence of a thing, because the witness had to his evidence of its observed reality annexed some conjecture in regard to its origin or cause. For the latter might well be shown to be absurd, and yet the former would remain unshaken. It is, therefore, always to be observed,—that it is only the self-contradiction of a testimony, *qua* testimony, that is, the self-contradiction of the fact itself, which is peremptorily and irrevocably subversive of its credibility.

We now proceed to the second question; that is, to consider in general the Credibility of a Testimony by reference to its subject, that is, in relation to the Personal Trustworthiness of the Witness. The trustworthiness of a witness consists of two elements or conditions. In the first place, he must be willing, in the second place, he must be able, to report the truth. The first of these elements is the Honesty,—the Sincerity,—the Veracity; the second is the Competency of the Witness. Both are equally necessary, and if one or other be deficient, the testimony becomes altogether null. These constituents, likewise, do not infer each other; for it frequently happens that where the honesty

2°, The Subject of the Testimony, or personal trustworthiness of the Witness. This consists of two elements:—(a) Honesty or Veracity.

is greatest the competency is least, and where the competency is greatest, the honesty is least. But when the veracity of a witness is established, there is established also a presumption of his competency; for an honest man will not bear evidence to a point in regard to which his recollection is not precise, or to the observation of which he had not accorded the requisite attention. In truth, when a fact depends on the testimony of a single witness, the competency of that witness is solely guaranteed by his honesty. In regard to the honesty of a witness,—this, though often admitting of the highest probability, never admits of absolute certainty; for, though in many cases, we may know enough of the general character of the witness to rely with perfect confidence on his veracity, in no case can we look into the heart, and observe the influence which motives have actually had upon his volitions. We are, however, compelled, in many of the most important concerns of our existence, to depend on the testimony, and, consequently, to confide in the sincerity, of others. But from the moral constitution of human nature, we are warranted in presuming on the honesty of a witness; and this presumption is enhanced in proportion as the following circumstances concur in its confirmation. In the first place, a witness is to be presumed veracious in this case, in proportion as his love of truth is already established from others. In the second place, a witness is to be presumed veracious, in proportion as he has fewer and weaker motives to falsify his testimony. In the third place, a witness is to be presumed veracious, in proportion to the likelihood of contradiction which his testimony would encounter, if he

The presumption of the Honesty of a Witness enhanced by certain circumstances.

deviated from the truth. So much for the Sincerity, Honesty, or Veracity of a witness.

(b) Competency of a Witness.

In regard to the Competency or Ability of a witness,—this, in general, depends on the supposition that he has had it in his power correctly to observe the fact to which he testifies, and correctly to report it. The presumption in favor of the competence of a witness rises in proportion as the following conditions are fulfilled:—In the first place, he must be presumed competent in reference to the case in hand, in proportion as his general ability to observe and to communicate his observation has been established in other cases. In the second place, the competency of a witness must be presumed, in proportion as in the particular case a lower and commoner amount of ability is requisite rightly to observe, and rightly to report the observation. In the third place, the competency of a witness is to be presumed, in proportion as it is not to be presumed that his observation was made or communicated at a time when he was unable correctly to make or correctly to communicate it. So much for the Competency of a witness.

Circumstances by which the presumption of competency is enhanced.

The credibility of Testimony not invalidated because the fact testified is one out of the ordinary course of experience.

Now, when both the good will and the ability, that is, when both the Veracity and Competence of a witness have been sufficiently established, the credibility of his testimony is not to be invalidated because the fact which it goes to prove is one out of the ordinary course of experience. Thus it would be false to assert, with Hume, that miracles, that is, suspensions of the ordinary laws of nature, are incapable of proof, because contradicted by what we have been able to observe. On the

contrary, where the trustworthiness of a witness or witnesses is unimpeachable, the very circumstance that the object is one in itself unusual and marvellous, adds greater weight to the testimony; for this very circumstance would itself induce men of veracity and intelligence to accord a more attentive scrutiny to the fact, and secure from them a more accurate report of their observation.

Summary regarding the Credibility of Testimony in general.

The result of what has now been stated in regard to the credibility of Testimony in general, is:—That a testimony is entitled to credit when the requisite conditions, both on the part of the object and on the part of the subject, have been fulfilled. On the part of the object these are fulfilled when the object is absolutely possible, as an object of the higher faculty of experience,—the Understanding,—the Elaborative Faculty, and relatively possible, as an object of the lower or subsidiary faculties of experience,—Sense, and Self-consciousness. In this case, the testimony, *qua* testimony, does not contradict itself. On the part of the subject the requisite conditions are fulfilled when the trustworthiness, that is, the veracity and competency of the witness, is beyond reasonable doubt. In regard to the veracity of the witness,—this cannot be reasonably doubted, when there is no positive ground on which to discredit the sincerity of the witness, and when the only ground of doubt lies in the mere general possibility of deception. And in reference to the competency of a witness,—this is exposed to no reasonable objection, when the ability of the witness to observe and to communicate the fact in testimony cannot be disallowed. Having, therefore, concluded the consideration of testimony in general, we proceed to treat of it in special, that is, in so far as it is viewed either as Immediate or as Mediate. Of these in their order.

The special consideration of Testimony, when that testimony is Immediate.—An immediate testimony, or testimony at first hand, is one in which the fact reported is an object of the proper or personal experience of the reporter. Now it is manifest, that an immediate witness is in general better entitled to credit than a witness at second hand; and his testimony rises in probability, in proportion as the requisites, already specified, both on the part of its object and on the part of its subject, are fulfilled. An immediate testimony is, therefore, entitled to credit,—1°, In proportion to the greater ability with which the observation has been made; 2°, In proportion to the less impediment in the way of the observation being perfectly accomplished; 3°, In proportion as what was observed could be fully and accurately remembered; and, 4°, In proportion as the facts observed and remembered have been communicated by intelligible and unambiguous signs.

II. Testimony in special, as Immediate and Mediate.

1°, Immediate Testimony.

Conditions of its Credibility.

Now, whether all these conditions of a higher credibility be fulfilled in the case of any immediate testimony,—this cannot be directly and at once ascertained; it can only be inferred, with greater or less certainty, from the qualities of the witness; and, consequently, the validity of a testimony can only be accurately estimated from a critical knowledge of the personal character of the witness, as given in his intellectual and moral qualities, and in the circumstances of his life, which have concurred to modify and determine these. The veracity of a witness either is, or is not, exempt from doubt; and, in the latter case, it may not only lie open to doubt,

Whether all these conditions are fulfilled in the case of any immediate testimony, cannot be directly ascertained.

but even be exposed to suspicion. If the sincerity of the witness be indubitable, a direct testimony is always preferable to an indirect; for a direct testimony being made with the sole intent of establishing the certainty of the fact in question, the competency of the witness is less exposed to objection. If, on the contrary, the sincerity of the witness be not beyond a doubt, and, still more, if it be actually suspected, in that case an indirect testimony is of higher cogency than a direct; for the indirect testimony being given with another view than merely to establish the fact in question, the intention of the witness to falsify the truth of the fact has not so strong a presumption in its favor. If both the sincerity and the competency of the witness are altogether indubitable, it is then of no importance whether the truth of the fact be vouched for by a single witness, or by a plurality of witnesses. On the other hand, if the sincerity and competency of the witness be at all doubtful, the credibility of a testimony will be greater, the greater the number of the witnesses by whom the fact is corroborated. But here it is to be considered, that when there are a plurality of testimonies to the same fact, these testimonies are either consistent or inconsistent. If the testimonies be consistent, and the sincerity and competency of all the witnesses complete, in that case the testimony attains the highest degree of probability of which any testimony is capable. Again, if the witnesses be inconsistent,—on this hypothesis two cases are possible; for either their discrepancy is negative, or it is positive. A negative discrepancy arises, where one witness passes over in silence what another witness positively avers. A positive discrepancy arises, where one witness

When testimony attains the highest degree of probability.

Negative and Positive Discrepancy.

explicitly affirms something, which something another witness explicitly denies. When the difference of testimonies is merely negative, we may suppose various causes of the silence; and, therefore, the positive averment of one witness to a fact is not disproved by the mere circumstance that the same fact is omitted by another. But if it be made out, that the witness who omits mention of the fact could not have been ignorant of that fact had it taken place, and, at the same time, that he could not have passed it over without violating every probability of human action,—in this case, the silence of the one witness manifestly derogates from the credibility of the other witness, and in certain circumstances may annihilate it altogether. Where, again, the difference is positive, the discrepancy is of greater importance, because (though there are certainly exceptions to the rule) an overt contradiction is, in general and in itself, of stronger cogency than a mere non-confirmation by simple silence. Now the positive discrepancy of testimonies either admits of conciliation, or it does not. In the former case, the credibility of the several testimonies stands intact; and the discrepancy among the witnesses is to be accounted for by such circumstances as explain, without invalidating, the testimony considered in itself. In the latter case, one testimony manifestly detracts from the credibility of another; for of incompatible testimonies, while both cannot be true, the one must be false, when reciprocally contradictory, or they may both be false, when reciprocally contrary. In this case, the whole question resolves itself into one of the greater or less trustworthiness of the opposing witnesses. Is the trustworthiness of the counter-witnesses equally great? In that case, neither of the conflictive testimonies is to be admitted. Again, is the trustworthiness of the witnesses not upon a

par? In that case, the testimony of the witness whose trustworthiness is the greater, obtains the preference,—and this more especially if the credibility of the other witnesses is suspected.

So much for the Credibility of Testimony, considered in Special, in so far as that testimony is Immediate or at First Hand; and I now, in the second place, pass on to consider likewise in special, the Credibility of Testimony, in so far as that testimony is Mediate, or at Second Hand.

2°, Mediate Testimony.

A Mediate Testimony is one where the fact is an object not of Personal, but of Foreign Experience. Touching the credibility of a mediate testimony, this supposes that the report of the immediate, and that the report of the mediate, witness are both trustworthy,—this we are either of ourselves able to determine, viz., from our personal acquaintance with its veracity and competence; or we are unable of ourselves to do this, in which case the credibility of the immediate must be taken upon the authority of the mediate witness. Here, however, it is necessary for us to be aware, that the mediate witness is possessed of the ability requisite to estimate the credibility of the immediate witness, and of the honesty to communicate the truth without retrenchment or falsification. But if the trustworthiness both of the mediate and of the immediate witness be sufficiently established, it is of no consequence, in regard to the credibility of a testimony, whether it be at first hand or at second. Nay, the testimony of a mediate may even tend to confirm the testimony of an immediate witness, when his own competence fairly to appreciate the report of the immediate witness is indubitable. If, however, the credibility of the immediate witness be unimpeachable, but

not so the credibility of the mediate, in that case the mediate testimony, in respect of its authority, is inferior to the immediate, and this in the same proportion as the credibility of the second hand witness is inferior to that of the witness at first hand. Further, mediate witnesses are either Proximate or Remote; and, in both cases, either Independent or Dependent. The trustworthiness of proximate witnesses is, in general, greater than the trustworthiness of remote; and the credibility of independent witnesses greater than the credibility of dependent. The remote witness is unworthy of belief, when the intermediate links are wanting between him and the original witness; and the dependent witness deserves no credit, when that on which his evidence depends is recognized as false or unestablished. Mediate testimonies are, likewise, either direct or indirect; and, likewise, when more than one, either reciprocally congruent or conflictive. In both cases the credibility of the witnesses is to be determined in the same manner as if the testimonies were immediate.

Mediate Witnesses are either Proximate or Remote, and either Independent or Dependent.

The testimony of a plurality of mediate witnesses, where there is no recognized immediate witness, is called a *rumor*, if the witnesses be contemporaneous; and a *tradition* if the witnesses be chronologically successive. These are both less entitled to credit, in proportion as in either case a fiction or falsification of the fact is comparatively easy, and, consequently, comparatively probable.

Rumor,—what. Tradition.

LECTURE VIII.—MODIFIED METHODOLOGY.

SECTION I.—OF THE ACQUISITION OF KNOWLEDGE.

I. EXPERIENCE. — B. FOREIGN: — RECORDED TESTIMONY AND WRITINGS IN GENERAL.

II. SPECULATION.

Criticism of Recorded Testimony and of Writings in general.

In our last Lecture, we were engaged in the consideration of Testimony, and the Principles by which its Credibility is governed,—on the supposition always that we possess the veritable report of the witness whose testimony it professes to be, and on the supposition that we are at no loss to understand its meaning and purport. But questions may arise in regard to these points, and, therefore, there is a further critical process requisite, in order to establish the Authenticity,—the Integrity, and the Signification, of the documents in which the testimony is conveyed. This leads to the important subject,—the Criticism of Recorded Testimony, and of Writings in general. I shall comprise the heads of the following observations on this subject in the ensuing paragraph.

Par. XX. Criticism and Interpretation.

¶ XX. The examination and judgment of Writings professing to contain the testimony of certain witnesses, and of Writings in General professing to be the work of certain authors, is of two parts. For the inquiry regards either, 1°, The Authenticity of the document, that is, whether it be, in whole or in part, the product of its ostensible author; for ancient writings in particular are frequently suppositious or interpolated; or, 2°, It regards the Meaning of the words of which it is composed, for these, especially when in languages now dead, are frequently obscure. The former of these problems is resolved by the *Art of Criticism (Critica,)* in the stricter sense of the term; the latter by the *Art of Interpretation (Exegetica* or *Hermeneutica.)* Criticism is of two kinds. If it be occupied with the criteria of the authenticity of a writing in its totality, or in its principal parts, it is called the *Higher*, and sometimes the *Internal, Criticism.* If, again, it consider only the integrity of particular words and phrases, it is called the *Lower*, and sometimes the *External, Criticism.* The former of these may perhaps be best styled the *Criticism of Authenticity;*—the latter, the *Criticism of Integrity.*

The problem which Interpretation has to solve is,—To discover and expound the meaning of a writer, from the words in which his thoughts are expressed. It departs from the principle, that however manifold be the possible meanings of the expressions, the sense of the writer is one. Interpretation, by reference to its sources or subsidia, has been divided into the *Grammatical*, the *Historical*, and the *Philosophical, Exegesis.*

Explication.

Testimonies, especially when the ostensible witnesses themselves can no longer be interrogated, may be subjected to an examination under various forms; and this examination is in fact indispensable, seeing not only that a false testimony may be substituted for a true, and a testimony true upon the whole may yet be falsified in its parts,—a practice which prevailed to a great extent in ancient times; while at the same time the meaning of the testimony, by reason either of the foreign character of the language in which it is expressed, or of the foreign character of thought in which it is conceived, may be obscure and undetermined. The examination of a testimony is twofold, inasmuch as it is either an examination of its Authenticity and Integrity, or an examination of its Meaning. This twofold process of examination is applicable to testimonies of every kind, but it becomes indispensable when the testimony has been recorded in writing, and when this, from its antiquity, has come down to us only in transcripts, indefinitely removed from the original, and when the witnesses are men differing greatly from ourselves in language, manners, customs, and associations of thought. The solution of the problem,—By what laws are the authenticity or spuriousness, the integrity or corruption, of a writing to be determined, —constitutes the Art of Criticism, in its stricter signification *(Critica)*; and the solution of the problem,—By what law is the sense or meaning of a writing to be determined, —constitutes the Art of Interpretation or Exposition *(Hermeneutica, Exegetica)*. In theory, Criticism ought to precede Interpretation, for

The examination of a testimony twofold, —of its Authenticity and Integrity, and of its Meaning.

Criticism.

Interpretation.

the question,—Who has spoken, naturally arises before the question,—How what has been spoken is to be understood. But in practice, criticism and interpretation cannot be separated; for in application they proceed hand in hand.

I. Criticism.

First, then, of Criticism; and the question that presents itself in the threshold is,—What are its Definition and Divisions? Under Criticism is to be understood the complement of logical rules, by which the authenticity or spuriousness, the integrity or interpolation, of a writing is to be judged. The problems which it proposes to answer are,—1°, Does a writing really proceed from the author to whom it is ascribed; and 2°, Is a writing, as we possess it, in all its parts the same as it came from the hands of its author. The system of fundamental rules, which are supposed in judging of the authenticity and integrity of every writing, constitutes what is called the *Doctrine of Universal Criticism;* and the system of particular rules, by which the authenticity and integrity of writings of a certain kind are judged, constitutes the doctrine of what is called *Special Criticism.* It is manifest, from the nature of Logic, that the doctrine of Universal Criticism is alone within its sphere. Now Universal Criticism is conversant either with the authenticity or spuriousness of a writing considered as a whole, or with the integrity or interpolation of certain parts. In the former case it is called *Higher,* in the latter, *Lower, Criticism;* but these denominations are inappropriate. The one criticism has also been styled the *Internal,* the other the *External;* but these appellations are, likewise, excep-

Its problems.

Universal Criticism.

Special Criticism.

Universal Criticism alone within the sphere of Logic.

Its Divisions.

tionable ; and, perhaps, it would be preferable to call the former the *Criticism of the Authenticity*, the latter, the *Criticism of the Integrity*, of a work. I shall consider these in particular ; and, first, of the Criticism of Authenticity.

1. Criticism of Authenticity.

A proof of the authenticity of a writing, more especially of an ancient writing, can be rested only upon two grounds, —an Internal and an External,—and on these either apart or in combination. By *internal grounds*, we mean those indications of authenticity which the writing itself affords. By *external grounds*, we denote the testimony borne by other works, of a corresponding antiquity, to the authenticity of the writing in question.

(a) Internal Grounds. These of themselves not sufficient to establish the authenticity of a writing.

In regard to the Internal Grounds ;—it is evident, without entering upon details, that these cannot of themselves, that is, apart from the external grounds, afford evidence capable of establishing beyond a doubt the authenticity of an ancient writing ; for we can easily conceive that an able and learned forger may accommodate his fabrications both to all the general circumstances of time, place, people, and language, under which it is supposed to have been written, and even to all the particular circumstances of the style, habit of thought, personal relations, etc., of the author by whom it professes to have been written, so that everything may militate for, and nothing militate against, its authenticity.

But omnipotent to disprove this.

But if our criticism from the internal grounds alone be, on the one hand, impotent to establish, it is, on the other, omnipotent to disprove. For it is sufficient to show that a writing is in essential parts, that is, parts which cannot be separated

from the whole, in opposition to the known manners, institutions, usages, etc., of that people with which it would, and must, have been in harmony, were it the product of the writer whose name it bears; that, on the contrary, it bears upon its face indications of another country or of a later age; and, finally, that it is at variance with the personal circumstances, the turn of mind, and the pitch of intellect, of its pretended author. And here it is to be noticed, that these grounds are only relatively internal; for we become aware of them originally only through the testimony of others, that is, through external grounds.

(b) External Grounds.

In regard to the External Grounds;—they, as I said, consist in the testimony, direct or indirect, given to the authenticity of the writing in question by other works of a competent antiquity. This testimony may be contained either in other and admitted writings of the supposed author himself; or in those of contemporary writers; or in those of writers approximating in antiquity. This testimony may also be given either directly by attribution of the disputed writing by title to the author; or indirectly, by quoting as his certain passages which are to be found in it. On this subject it is needless to go into detail, and it is hardly necessary to observe, that the proof of the authenticity is most complete when it proceeds upon the internal and external grounds together. I, therefore, pass on to the Criticism of Integrity.

2. Criticism of Integrity.

When the authenticity of an ancient work has been established on external grounds, and been confirmed on internal, the integrity of this writing is not therewith proved; for it is very possible, and in ancient writings indeed very probable, that particular passages are either interpolated or corrupted.

The authenticity of particular passages is to be judged of precisely by the same laws which regulate our criticism of the authenticity of the whole work. The proof most pertinent to the authenticity of particular passages is drawn—1°, From their acknowledgment by the author himself in other, and these unsuspected, works; 2°, From the attribution of them to the author by other writers of competent information; and, 3°, From the evidence of the most ancient MSS. On the other hand, a passage is to be obelized as spurious,—1°, When found to be repugnant to the general relations of time and place, and to the personal relations of the author; 2°, When wanting in the more ancient codices, and extant only in the more modern. A passage is suspicious, when any motive for its interpolation is manifest, even should we be unable to establish it as spurious. The differences which different copies of a writing exhibit in the particular passages, are called *various readings (variæ lectiones* or *lectiones variantes)*. Now, as of various readings only one can be the true, while they may all very easily be false, the problem which the criticism of Integrity proposes to solve is,—How is the genuine reading to be made out; and herein consists what is technically called the *Recension*, more properly the *Emendation*, of the text.

Emendation of the text,—of two kinds, viz., Historical and Conjectural.

The Emendation of an ancient author may be of two kinds; the one of which may be called *Historical*, the other the *Conjectural*. The former of these founds upon historical data for its proof; the latter, again, proceeds on grounds which lie beyond the sphere of historical fact, and this for the very reason that historical fact is found incompetent to the restoration of the text to its original integrity. The historical emendation necessarily

precedes the conjectural, because the object itself of emendation is wholly of an historical character, and because it is not permitted to attempt any other than an emendation on historical grounds, until, from these very grounds themselves, it be shown that the restitution of the text to its original integrity cannot be historically accomplished. Historical Emendation is again of two kinds, according as its judgment proceeds on external or on internal grounds.

Historical Emendation of two kinds,—External and Internal.

It founds upon external grounds, when the reasons for the truth or falsehood of a reading are derived from testimony; it founds upon internal grounds when the reasons for the truth or falsehood of a reading are derived from the writing itself. Historical emendation has thus a two-fold function to perform (and in its application to practice, these must always be performed in conjunction), viz., it has carefully to seek out and accurately to weigh both the external and internal reasons in support of the reading in dispute. Of external grounds the principal consists in the confirmation afforded by MSS., by printed editions which have immediately emanated from MSS., by ancient translations, and by passages quoted in ancient authors. The internal grounds are all derived either from the form, or from the contents, of the work itself. In reference to the form,—a reading is probable, in proportion as it corresponds to the general character of the language prevalent at the epoch when the work was written, and to the peculiar character of the language by which the author himself was distinguished. In reference to the contents,—a reading is probable, when it harmonizes with the context, that is, when it concurs with the other words of the particular passage in which it stands, in affording a meaning reasonable in itself,

and conformable with the author's opinions, reasonings, and general character of thought.

Conjectural Emendation.

It frequently happens, however, that, notwithstanding the uniformity of MSS., and other external subsidia, a reading cannot be recognized as genuine. In this case, it must be scientifically shown from the rules of criticism itself that this lection is corrupt. If the demonstration thus attempted be satisfactory, and if all external subsidia have been tried in vain, the critic is permitted to consider in what manner the corrupted passage can be restored to its integrity. And here the conjectural or divinatory emendation comes into play; a process in which the power and efficiency of criticism and the genius of the critic are principally manifested.

So much for Criticism, in its applications both to the Authenticity and to the Integrity of Writings. We have now to consider the general rules by which Interpretation, that is, the scientific process of expounding the Meaning of an author, is regulated.

II. Interpretation.

By the *Art of Interpretation*, called likewise technically *Hermeneutic* or *Exegetic*, is meant the complement of logical laws, by which the sense of an ancient writing is to be evolved. Hermeneutic

General or Special.

is either General or Special. General, when it contains those laws which apply to the interpretation of any writing whatever; Special, when it comprises those laws by which writings of a particular kind are to be expounded. The former of these alone is of logical concernment. The problem proposed for the Art of Interpretation to solve, is,—How are we to proceed in order to discover from the words of a writing that sole meaning which the author intended them to convey? In

the interpretation of a work, it is not, therefore, enough to show in what signification its words may be understood; for it is required that we show in what signification they must. To the execution of this task two conditions are absolutely necessary; 1°, That the interpreter should be thoroughly acquainted with the language itself in general, and with the language of the writer in particular; and 2°, That the interpreter should be familiar with the subjects of which the writing treats. But these two requisites, though indispensable, are not of themselves sufficient. It is also of importance that the expositor should have a competent acquaintance with the author's personal circumstances and character of thought, and with the history and spirit of the age and country in which he lived. In regard to the interpretation itself,—it is to be again observed, that as a writer could employ expressions only in a single sense, so the result of the exposition ought to be not merely to show what meaning may possibly attach to the doubtful terms, but what meaning necessarily must. When, therefore, it appears that a passage is of doubtful import, the best preparative for a final determination of its meaning is, in the first place, to ascertain in how many different significations it may be construed, and then, by a process of exclusion, to arrive at the one veritable meaning. When, however, the obscurity cannot be removed, in that case it is the duty of the expositor, before abandoning his task, to evince that an interpretation of the passage is, without change, absolutely or relatively impossible.

Sources of Interpretation.

As to the sources from whence the Interpretation is to be drawn,—these are three in all,—viz., 1°, The *Tractus literarum*, the words themselves, as they appear in MSS.; 2°, The context, that is, the passage in immediate connection

with the doubtful term; 3°, Parallel or analogous passages in the same, or in other writings. How the interpretation drawn from these sources is to be applied, I shall not attempt to detail; but pass on to a more generally useful and interesting subject.

Speculation the Second Means of Knowledge.

So much for Experience or Observation, the first mean of scientific discovery, that, viz., by which we apprehend what is presented as contingent phænomena, and by whose process of Induction and Analogy we carry up individual into general facts. We have now to consider the other mean of scientific discovery, that, viz., by which, from the phænomena presented as contingent, we separate what is really necessary, and thus attain to the knowledge, not of merely generalized facts, but of universal laws. This mean may, for distinction's sake, be called *Speculation*, and its general nature I comprehend in the following paragraph.

Par. XXI. Speculation, — as a means of Knowledge.

¶ XXI. When the mind does not rest contented with observing and classifying the objects of its experience, but, by a reflective analysis, sunders the concrete wholes presented to its cognition, throws out of account all that, as contingent, it can think away from, and concentrates its attention exclusively on those elements which, as necessary conditions of its own acts, it cannot but think;—by this process it obtains the knowledge of a certain order of facts,—facts of Self-consciousness, which, as essential to all Experience, are not the result of any; constituting in truth the Laws by which the possibility of our cognitive functions is determined. This process, by which we thus attain to a discrimi-

native knowledge of the *Necessary*, *Native*, and, as they are also called, the *Noetic*, *Pure*, *a priori*, or *Transcendental*, *Elements of Thought*, may be styled *Speculative Analysis*, *Analytic Speculation*, or *Speculation* simply, and is carefully to be distinguished from Induction, with which it is not unusually confounded.

Explication.

The empirical knowledge of which we have hitherto been speaking, does not, however varied and extensive it may be, suffice to satisfy the thinking mind as such; for our empirical knowledge itself points at certain higher cognitions from which it may obtain completion, and which are of a very different character from that by which the mere empirical cognitions themselves are distinguished. The cognitions are styled, among other names, by those of *noetic*, *pure*, or *rational*, and they are such as cannot, though manifested in experience, be derived from experience; for, as the conditions under which experience is possible, they must be viewed as necessary constituents of the nature of the thinking principle itself. Philosophers have indeed been found to deny the reality of such cognitions native to the mind; and to confine the whole sphere of human knowledge to the limits of experience. But in this case philosophers have overlooked the important circumstance, that the acts, that is, the apprehension and judgment, of experience, are themselves impossible, except under the supposition of certain potential cognitions previously existent in the thinking subject, and which become actual on occasion of an object being presented to the external or internal sense. As an example of a noetic cognition, the following propositions may suffice:—An object and all its attributes are convertible;—All that is has its sufficient cause. The principal distinctions

of Empirical and Rational Knowledges, or rather Empirical and Noetic Cognitions, are the following: —1°, Empirical Cognitions originate exclusively in experience, whereas Noetic Cognitions are virtually at least before or above all experience,—all experience being only possible through them. 2°, Empirical cognitions come piecemeal and successively into existence, and may again gradually fade and disappear; whereas noetic cognitions, like Pallas, armed and immortal from the head of Jupiter, spring at once into existence, complete and indestructible. 3°, Empirical cognitions find only an application to these objects from which they were originally abstracted, and, according as things obtain a different form, they also may become differently fashioned; noetic cognitions, on the contrary, bear the character impressed on them of necessity, universality, sameness. Whether a cognition be empirical or noetic, can only be determined by considering whether it can or cannot be presented in a sensible perception;—whether it do or do not stand forward clear, distinct, and indestructible, bearing the stamp of necessity and absolute universality. The noetic cognitions can be detected only by a critical analysis of the mental phænomena proposed for the purpose of their discovery; and this analysis may, as I have said, be styled Speculation, for want of a more appropriate appellation.

Principal distinctions of Empirical and Noetic Cognitions.

LECTURE IX.—MODIFIED METHODOLOGY.

SECTION I.—OF THE ACQUISITION OF KNOWLEDGE.

III. COMMUNICATION OF KNOWLEDGE.—A. INSTRUCTION—ORAL AND WRITTEN.—B. CONFERENCE —DIALOGUE AND DISPUTATION.

I NOW go on to the last Mean of Acquiring and Perfecting our knowledge; and commence with the following paragraph:

¶ XXII. An important mean for the Acquisition and Perfecting of Knowledge is the Communication of Thought. Considered in general, the Communication of thought is either One-sided, or Mutual. The former is called *Instruction (institutio)*, the latter, *Conference (collocutio)*; but these, though in theory distinct, are in practice easily combined. Instruction is again either *Oral* or *Written*; and Conference, as it is interlocutory and familiar, or controversial and solemn, may be divided into *Dialogue (colloquium, dialogus)*, and *Disputation (disputatio, concertatio)*. The Communication of thought in all its forms is a means of intel-

Par. XXII. The Communication of Thought, — as a means of Acquiring and Perfecting Knowledge.

lectual improvement, not only to him who receives, but to him who bestows, information; in both relations, therefore, it ought to be considered, and not, as is usually done, in the former only.

Explication.

In illustrating this paragraph, I shall commence with the last sentence, and, before treating in detail of Instruction and Conference, as means of extending the limits of our knowledge by new acquisitions derived from the communication of others, I shall endeavour to show, that the Communication of Thought is itself an important mean towards the perfecting of knowledge in the mind of the communicator himself. In this view, the communication of knowledge is like the attribute of mercy, twice blessed,—"blessed to him that gives and to him that takes;" in teaching others we in fact teach ourselves.

The Communication of Thought an important mean towards the perfecting of Knowledge in the mind of the communicator.

This view of the reflex effect of the communication of thought on the mind, whether under the form of Instruction or of Conference, is one of high importance, but it is one which has, in modern times, unfortunately been almost wholly overlooked. To illustrate it in all its bearings would require a volume; at present I can only contribute a few hints towards its exposition.

Man is, by an original tendency of his nature, determined to communicate to others what occupies his thoughts, and by this communication he obtains a clearer understanding of the subject of his cogitations than he could otherwise have compassed. This fact did not escape the acuteness of Plato. In the *Protagoras*,—

Man naturally determined to communication.

This fact noticed by Plato.

"It has been well," says Plato (and he has had sundry passages to the point),—"It has been well, I think, observed by Homer—

> 'Through mutual intercourse and mutual aid,
> Great deeds are done and great discoveries made;
> The wise new wisdom on the wise bestow,
> Whilst the lone thinker's thoughts come slight and slow.'

For in company we, all of us, are more alert, in deed and word and thought. *And if a man excogitate aught by himself, forthwith he goes about to find some one to whom he may reveal it, and from whom he may obtain encouragement, aye and until his discovery be completed.*" The same doctrine is maintained by Aristotle, and illustrated by the same quotation; (to which, indeed, is to be referred the adage,—"*Unus homo, nullus homo.*")—"We rejoice," says Themistius, "in hunting truth in company, as in hunting game." Lucilius,—"*Scire est nescire, nisi id me scire alius scierit;*" paraphrased in the compacter, though far inferior, verse of Persius,—"*Scire tuum nihil est, nisi te scire hoc sciat alter.*" Cicero's Cato testifies to the same truth:—"*Non facile est invenire, qui quod sciat ipse, non tradat alteri.*" And Seneca:—"*Sic cum hac exceptione detur sapientia, ut illam inclusam teneam nec enunciem, rejiciam. Nullius boni, sine socio, jucunda possessio est.*"

Aristotle. Themistius. Lucilius. Persius. Cicero. Seneca.

"*Condita tabescit, vulgata scientia crescit.*"

"*In hoc gaudeo aliquid discere, ut doceam: nec me ulla res delectabit, licet eximia sit et salutaris, quam mihi uni, sciturus sim.*" "*Ita non solum ad discendum propensi sumus, verum etiam ad docendum.*"

The modes in which the Communication of thought is conducive to the perfecting of thought itself, are two; for the mind may be determined to more exalted energy by the sympathy of society, and by the stimulus of opposition; or it may be necessitated to more distinct, accurate, and orderly thinking, as this is the condition of distinct, accurate, and orderly communication. Of these the former requires the presence of others during the act of thought, and is, therefore, only manifested in oral instruction or in conference: whereas the latter is operative both in our oral and in our written communications. Of these in their order.

Modes in which Communication is conducive to the Perfecting of Thought are two.

In the first place, then, the influence of man on man in reciprocally determining a higher energy of the faculties, is a phænomenon sufficiently manifest. By nature a social being, man has powers which are relative to, and, consequently, find their development in, the company of his fellows; and this is more particularly shown in the energies of the cognitive faculties. "As iron sharpeneth iron," says Solomon, "so a man sharpeneth the understanding of his friend." This, as I have said, is effected both by fellow-feeling and by opposition. We see the effects of fellow-feeling in the necessity of an audience to call forth the exertions of the orator. Eloquence requires numbers; and oratory has only flourished where the condition of large audiences has been supplied. But opposition is perhaps still more powerful than mere sympathy in calling out the resources of the intellect.

1. By reciprocally determining a higher energy of the faculties.

(a) Through sympathy.

(b) Through Opposition.

In the mental as well as in the material world, action and reäction are ever equal; and Plutarch well observes, that as motion would cease were contention to be taken out of the physical universe, so progress in improvement would cease were contention taken out of the moral; πόλεμος ἁπάντων πατήρ.

Plutarch.

"It is maintained," says the subtle Scaliger, "by Vives, that we profit more by silent meditation than by dispute. This is not true. For as fire is elicited by the collision of stones, so truth is elicited by the collision of minds. I myself (he adds) frequently meditate by myself long and intently; but in vain; unless I find an antagonist, there is no hope of a successful issue. By a master we are more excited than by a book; but an antagonist, whether by his pertinacity or his wisdom, is to me a double master."

Scaliger, J. C.

But, in the second place, the necessity of communicating a piece of knowledge to others, imposes upon us the necessity of obtaining a fuller consciousness of that knowledge for ourselves. This result is to a certain extent secured by the very process of clothing our cogitations in words. For speech is an analytic process; and to express our thoughts in language, it is requisite to evolve them from the implicit into the explicit, from the confused into the distinct, in order to bestow on each part of the organic totality of a thought its precise and appropriate symbol. But to do this is in fact only to accomplish the first step towards the perfecting of our cognitions or thoughts.

2. By imposing the necessity of obtaining a fuller consciousness of knowledge for ourselves.

But the communication of thought, in its higher applica-

tions, imposes on us far more than this; and in so doing it reäcts with a still more beneficial influence on our habits of thinking. Suppose that we are not merely to express our thoughts as they spontaneously arise; suppose that we are not merely extemporaneously to speak, but deliberately to write, and that what we are to communicate is not a simple and easy, but a complex and difficult, matter. In this case, no man will ever fully understand his subject who has not studied it with the view of communication, while the power of communicating a subject is the only competent criterion of his fully understanding it. "When a man," says Godwin, "writes a book of methodical investigation, he does not write because he understands the subject, but he understands the subject because he has written. He was an uninstructed tyro, exposed to a thousand foolish and miserable mistakes, when he began his work, compared with the degree of proficiency to which he has attained when he has finished it. He who is now an eminent philosopher, or a sublime poet, was formerly neither the one nor the other. Many a man has been overtaken by a premature death, and left nothing behind him but compositions worthy of ridicule and contempt, who, if he had lived, would perhaps have risen to the highest literary eminence. If we could examine the school exercises of men who have afterwards done honour to mankind, we should often find them inferior to those of their ordinary competitors. If we could dive into the portfolios of their early youth, we should meet with abundant matter for laughter at their senseless incongruities, and for contemptuous astonishment.

Influence of Composition and Instruction in perfecting our Knowledge.

Godwin quoted.

"The one exclusive sign," says Aristotle, "that a man is thoroughly cognizant of anything, is that he is able to teach it;" and Ovid,—

Aristotle.

"*Quodque parum novit nemo docere potest.*"

In this reäctive effect of the communication of knowledge in determining the perfection of the knowledge communicated, originated the scholastic maxim *Doce ut discas*,—a maxim which has unfortunately been too much overlooked in the schemes of modern education. In former ages, *teach that you may learn* always constituted one at least of the great means of intellectual cultivation. "To teach," says Plato, "is the way for a man to learn most and best." "*Homines dum docent discunt*," says Seneca. "In teaching," says Clement of Alexandria, "the instructor often learns more than his pupils." "*Disce sed a doctis; indoctos ipse doceto*," is the precept of Dionysius Cato; and the two following were maxims of authority in the discipline of the middle ages. The first—

Plato.
Seneca.
Clement of Alexandria.
Dionysius Cato.

"*Multa rogare, rogata tenere, retenta docere,*
Haec tria, discipulum faciunt superare magistrum."

The second—

"*Discere si quaeris doceas; sic ipse doceris;*
Nam studio tali tibi proficis atque sodali."

This truth is also well enforced by the great Vives. "*Doctrina est traditio corum quae quis novit ei qui non novit. Disciplina est illius traditionis acceptio; nisi quod mens accipientis impletur, dantis vero non exhauritur,—imo communicatione augetur eruditio,*

Vives.

sicut ignis, motu atque agitatione. Excitatur enim ingenium, et discurrit per ea quae ad præsens negotium pertinent: ita invenit atque excudit multa, et quae in mentem non veniebant cessanti, docenti, aut disserenti occurunt, calore acuente vigorem ingenii. Idcirco, nihil est ad magnam eruditionem perinde conducens, ut docere." The celebrated logician, Dr. Robert Sanderson, used to say: "I learn much from my master, more from my equals, and most of all from my disciples."

Sanderson.

But I have occupied perhaps too much time on the influence of the communication of knowledge on those by whom it is made; and shall now pass on to the consideration of its influence on those to whom it is addressed. And in treating of communication in this respect, I shall, in the first place, consider it as One-sided, and, in the second, as Reciprocal or Bilateral.

Influence of the communication of Knowledge on those to whom it is addressed.

The Unilateral Communication of knowledge, or Instruction, is of two kinds, for it is either Oral or Written; but as both these species of instruction propose the same end, they are both, to a certain extent, subject to the same laws.

1. Instruction,—Oral and Written.

Oral and Written Instruction have each their peculiar advantages.

In the first place, instruction by the living voice has this advantage over that of books, that, as more natural, it is more impressive. Hearing rouses the attention and keeps it alive far more effectually than reading. To this we have the testimony of the most competent observers. "Hearing," says Theophrastus, "is of all the senses the most pathetic," that is, it is the

Oral instruction,—its advantages.

(a) More natural, therefore more impressive.

Theophrastus.

sense most intimately associated with sentiment and passion.

Younger Pliny.

"*Multo magis*," says the Younger Pliny, "*multo magis* viva vox *afficit. Nam, licet acriora sunt quæ legas, altius tamen in animo sedent quæ pronuntiatio, vultus, habitus, gestus etiam dicentis adfigit.*"

Valerius Maximus.

"*Plus prodest*," says Valerius Maximus, "docentem audiere, *quam in libris studere; quia vehementior fit impressio in mentibus audientium, ex visu doctoris et auditu, quam ex studio et libro.*"

St. Jerome.

And St. Jerome—"*Habet nescio quid latentis energiæ* viva vox; *et in aures discipuli de doctoris ore transfusa, fortius sonat.*"

(b) Less permanent therefore more attended to.

A second reason why our Attention (and Memory is always in the ratio of Attention) to things spoken is greater than to things read, is that what is written we regard as a permanent possession to which we can always recur at pleasure; whereas we are conscious that the "winged words" are lost to us forever, if we do not catch them as they fly. As Pliny hath it: "*Legendi semper est occasio; audiendi non semper.*"

A third cause of the superior efficacy of oral instruction is that man is a social animal. He is thus naturally disposed to find pleasure in society, and in the performance of the actions performed by those with whom he consorts. But reading is a solitary, hearing is a social act. In reading, we are not determined to attend by any fellow-feeling with others attending; whereas in hearing, our attention is not only engaged by our sympathy with the speaker, but by our sympathy with the other attentive auditors around us.

(c) Hearing a social act.

Such are the causes which concur in rendering Oral

Instruction more effectual than Written. "M. Varillas," says Menage (and Varillas was one of the most learned of modern historians,- and Menage one of the most learned of modern scholars), "M. Varillas himself told me one day, that of every ten things he knew, he had learned nine of them in conversation. I myself might say nearly the same thing."

Menage quoted.

On the other hand, Reading, though only a substitute for Oral Instruction, has likewise advantages peculiar to itself. In the first place, it is more easily accessible. In the second, it is more comprehensive in its sphere of operation. In the third, it is not transitory with the voice, but may again and again be taken up and considered, so that the object of the instruction may thus more fully be examined and brought to proof. It is thus manifest, that oral and written instruction severally supply and severally support each other; and that, where this is competent, they ought always to be employed in conjunction. Oral instruction is, however, in the earlier stages of education, of principal importance; and written ought, therefore, at first only to be brought in as a subsidiary. A neglect of the oral instruction, and an exclusive employment of the written,—the way in which those who are self-taught (the autodidacti) obtain their education,—for the most part betrays its one-sided influence by a contracted cultivation of the intellect, with a deficiency in the power of communicating knowledge to others.

Reading,—its advantages.
(a) More easily accessible.
(b) More comprehensive.
(c) More permanent.

Oral instruction necessarily supposes a speaker and a hearer; and written instruction a writer and a reader. In these, the capacity of the speaker and of the writer must

equally fulfil certain common requisites. In the first place, they should be fully masters of the subject with which their instruction is conversant; and in the second, they should be able and willing to communicate to others the knowledge which they themselves possess. But in reference to these several species of instruction, there are various special rules that ought to be attended to by those who would reap the advantages they severally afford. I shall commence with Written Instruction, and comprise the rules by which it ought to be regulated, in the following paragraph.

Par. XXIII. Written Instruction, and its employment as a means of intellectual improvement.

¶ XXIII. In regard to Written Instruction, and its profitable employment as a means of intellectual improvement, there are certain rules which ought to be observed, and which together constitute the Proper Method of Reading. These may be reduced to three classes, as they regard, 1°, The Quantity, 2°, The Quality, of what is to be read, or, 3°, The Mode of Reading what is to be read.

I. As concerns the Quantity of what is to be read, there is a single rule,—read much, but not many works *(multum non multa)*.

II. As concerns the Quality of what is to be read,—there may be given five rules, 1°, Select the works of principal importance, estimated by relation to the several sciences themselves, or to your particular aim in reading, or to your individual disposition and wants. 2°, Read not the more detailed works upon a science, until you have obtained a rudimentary knowledge of it in general. 3°, Make yourselves familiar with a science in its actual or present

state, before you proceed to study it in its chronological development. 4°, To avoid erroneous and exclusive views, read and compare together the more important works of every sect and party. 5°, To avoid a one-sided development of mind, combine with the study of works which cultivate the Understanding, the study of works which cultivate the Taste.

III. As concerns the Mode or Manner of reading itself, there are four principal rules. 1°, Read that you may accurately remember, but still more, that you may fully understand. 2°, Strive to compass the general tenor of a work, before you attempt to judge of it in detail. 3°, Accommodate the intensity of the reading to the importance of the work. Some books are, therefore, to be only dipped into; others are to be run over rapidly; and others to be studied long and sedulously. 4°, Regulate on the same principle the extracts which you make from the works you read.

I. In reference to the head of Quantity, the single rule is—Read much, but not many works. Though this golden rule has risen in importance, since the world, by the art of printing, has been overwhelmed by the multitude of books, it was still fully recognized by the great thinkers of antiquity. It is even hinted by Solomon, when he complains that "of making many books there is no end." By Quintillian, by the younger Pliny, and by Seneca, the maxim, "*multum legendum esse, non multa*," is laid down as the great rule of study. "All," says Luther in his Table Talk, "who would study with advantage in any art whatsoever, ought to betake

Explication.
I. Quantity to be read.
Rule.
Solomon.
Quintillian.
Younger Pliny.
Seneca.
Luther quoted.

themselves to the reading of some sure and certain books oftentimes over; for to read many books produceth confusion, rather than learning, like as those who dwell everywhere, are not anywhere at home." He alludes here to the saying of Seneca, "*Nusquam est qui ubique est.*" And like as in society, we use not daily the community of all our acquaintances, but of some few selected friends, even so likewise ought we to accustom ourselves to the best books, and to make the same familiar unto us, that is, to have them, as we used to say, at our finger ends. The great logician, Bishop Sanderson, to whom I formerly referred, as his friend and biographer Isaac Walton informs us, said "that he declined reading many books; but what he did read were well chosen, and read so often that he became very familiar with them. They were principally three,—Aristotle's *Rhetoric*, Aquinas's *Secunda Secundæ*, and Cicero, particularly his *Offices*." The great Lord Burleigh, we are told by his biographer, carried Cicero *De Officiis*, with Aristotle's *Rhetoric*, always in his bosom; these being complete pieces, "that would make both a scholar and an honest man." "Our age," says Herder, "is the reading age;" and he adds, "it would have been better, in my opinion, for the world and for science, if, instead of the multitude of books which now overlay us, we possessed only a few works good and sterling, and which, as few, would, therefore, be more diligently and profoundly studied." I might quote to you many other testimonies to the same effect; but testimonies are useless in support of so manifest a truth.

Sanderson.

Lord Burleigh.

Herder.

For what purpose,—with what intent, do we read? We read not for the sake of reading, but we read to the end

that we may think. Reading is valuable only as it may supply to us the materials which the mind itself elaborates. As it is not the largest quantity of any kind of food, taken into the stomach, that conduces to health, but such a quantity of such a kind as can be best digested; so it is not the greatest complement of any kind of information that improves the mind, but such a quantity of such a kind as determines the intellect to most vigorous energy. The only profitable reading is that in which we are compelled to think, and think intensely; whereas that reading which serves only to dissipate and divert our thought, is either positively hurtful, or useful only as an occasional relaxation from severe exertion. But the amount of vigorous thinking is usually in the inverse ratio of multifarious reading. Multifarious reading is agreeable; but, as a habit, it is, in its way, as destructive to the mental as dram-drinking is to the bodily health.

End of Reading.

II. In reference to the Quality of what is to be read, the First of the five rules is—"Select the works of principal importance, in accommodation either to the several sciences themselves, or to your particular aim in reading, or to your individual disposition and wants. This rule is too manifestly true to require any illustration of its truth. No one will deny that for the accomplishment of an end you ought to employ the means best calculated for its accomplishment. This is all that the rule inculcates. But while there is no difficulty about the expediency of obeying the rule, there is often considerable difficulty in obeying it. To know what books ought to be read in order to learn a science, is in fact frequently obtained after the science has been already learned. On this point no

II. Quality of what is to be read.

First Rule.

general advice can be given. We have, on all of the sciences, works which profess to supply the advice which the student here requires. But in general, I must say, they are of small assistance in pointing out what books we should select, however useful they may be in showing us what books exist upon a science. In this respect, the British student also labours under peculiar disadvantages. The libraries in this country are, one and all of them, wretchedly imperfect; and there are few departments of science in which they are not destitute even of the works of primary necessity,—works which, from their high price, but more frequently from the difficulty of procuring them, are beyond the reach of ordinary readers.

Second Rule.

Under the head of Quality the Second Rule is—"Read not the more detailed works upon a science, until you have obtained a rudimentary knowledge of it in general." The expediency of this rule is sufficiently apparent. It is altogether impossible to read with advantage an extensive work on any branch of knowledge, if we are not previously aware of its general bearing, and of the relations in which its several parts stand to each other. In this case, the mind is overpowered and oppressed by the mass of details presented to it,—details, the significance and subordination of which it is as yet unable to recognize. A conspectus,—a survey of the science as a whole, ought, therefore, to precede the study of it in its parts; we should be aware of its distribution, before we attend to what is distributed,—we should possess the empty frame-work, before we collect the materials with which it is to be filled. Hence the utility of an encyclopædical knowledge of the sciences in general, preliminary to a study of the several sciences in particular; that is,

a summary knowledge of their objects, their extent, their connection with each other. By this means the student is enabled to steer his way on the wide ocean of science. By this means he always knows whereabouts he is, and becomes aware of the point towards which his author is leading him.

In entering upon the study of such authors as Plato, Aristotle, Descartes, Spinoza, Leibnitz, Locke, Kant, etc., it is, therefore, proper that we first obtain a preparatory acquaintance with the scope, both of their philosophy in general, and of the particular work on which we are about to enter. In the case of writers of such ability this is not difficult to do, as there are abundance of subsidiary works, affording the preliminary knowledge of which we are in quest. But in the case of treatises where similar assistance is not at hand, we may often, in some degree, prepare ourselves for a regular perusal, by examining the table of contents, and taking a cursory inspection of its several departments. In this respect, and also in others, the following advice of Gibbon to young students is highly deserving of attention. "After a rapid glance (I translate from the original French)—after a rapid glance on the subject and distribution of a new book, I suspend the reading of it, which I only resume after having myself examined the subject in all its relations,—after having called up in my solitary walks all that I have read, thought, or learned in regard to the subject of the whole book, or of some chapter in particular. I thus place myself in a condition to estimate what the author may add to my general stock of knowledge; and I am thus sometimes favorably disposed by the accordance, sometimes armed by the opposition, of our views.

Gibbon quoted.

Third Rule.

The third Rule under the head of Quality is—"Make yourselves familiar with a science in its present state, before you proceed to study it in its chronological development." The propriety of this procedure is likewise manifest. Unless we be acquainted with a science in its more advanced state, it is impossible to distinguish between what is more or less important, and, consequently, impossible to determine what is or is not worthy of attention in the doctrines of its earlier cultivators. We shall thus also be overwhelmed by the infinitude of details successively presented to us; all will be confusion and darkness where all ought to be order and light. It is thus improper to study philosophy historically, or in its past progress, before we have studied it statistically, or in its actual results.

Fourth Rule.

The Fourth Rule under the same head is—"To avoid erroneous and exclusive views, read and compare together the more important works of every party." In proportion as different opinions may be entertained in regard to the objects of a science, the more necessary is it that we should weigh with care and impartiality the reasons on which these different opinions rest. Such a science, in particular, is philosophy, and such sciences, in general, are those which proceed out of philosophy. In the philosophical sciences, we ought, therefore, to be especially on our guard against that partiality which considers only the arguments in favor of particular opinions. It is true that in the writings of one party we find adduced the reasons of the opposite party; but frequently so distorted, so mutilated, so enervated, that their refutation occasions little effort. We must, therefore, study the arguments on both sides, if we would avoid those one-sided and contracted

views which are the result of party-spirit. The precept of the Apostle, "Test all things, hold fast by that which is good," is a precept which is applicable equally in philosophy as in theology, but a precept that has not been more frequently neglected in the one study than in the other.

Fifth Rule.

The Fifth Rule under the head of Quality is—"To avoid a one-sided development of mind, combine with the study of works which cultivate the Understanding, the study of works which cultivate the Taste." The propriety of this rule requires no elucidation; I, therefore, pass on to the third head—viz., the manner of reading itself; under which the First Rule is—"Read that you may accurately remember, but still more that you may fully understand."

III. Manner of Reading.

First Rule.

This also requires no comment. Reading should not be a learning by rote, but an act of reflective thinking. Memory is only a subsidiary faculty,—is valuable merely as supplying the materials on which the understanding is to operate. We read, therefore, principally, not to remember facts, but to understand relations. To commit, therefore, to memory what we read, before we elaborate it into an intellectual possession, is not only useless but detrimental; for the habit of laying up in memory what has not been digested by the understanding, is at once the cause and the effect of mental weakness.

Second Rule.

The Second Rule under this head is—"Strive to compass the general tenor of a work, before you attempt to judge of it in detail." Nothing can be more absurd than the attempt to judge a part before comprehending the whole; but unfortunately nothing is

more common, especially among professional critics,—reviewers. This proceeding is, however, as frequently the effect of wilful misrepresentation, as of unintentional error.

Third Rule.

The Third Rule under this head is—"Accommodate the intensity of the reading to the importance of the work. Some books are, therefore, to be only dipped into; others are to be run over rapidly; and others to be studied long and sedulously." All books are not to be read with the same attention; and, accordingly, an ancient distinction was taken of reading into *lectio cursoria* and *lectio stataria*. The former of these we have adopted into English, cursorary reading being a familiar and correct translation of *lectio cursoria*. But *lectio stataria* cannot be so well rendered by the expression of *stationary reading*.

Lectio cursoria.
Lectio stataria.

Bacon quoted.

"Read not," says Bacon, in his Fiftieth Essay—"read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to weigh and consider. Some books are to be tasted, others are to be swallowed, and some few to be chewed and digested; that is, some books are to be read only in parts; others to be read, but not curiously; and some few to be read wholly and with diligence and attention. Some books also may be read by deputy, and extracts made of them by others; but that would be only in the less important arguments, and the meaner sort of books; else distilled books are, like common distilled waters, fleshy things."

Johann von Müller.

"One kind of book," says the great historian, Johann von Müller, "I read with great rapidity, for in these there is much dross

to throw aside, and little gold to be found; some, however, there are all gold and diamonds, and he who, for example, in Tacitus can read more than twenty pages in four hours, certainly does not understand him."

Rapidity in reading depends, however, greatly on our acquaintance with the subject of discussion. At first, upon a science we can only read with profit few books, and laboriously. By degrees, however, our knowledge of the matters treated expands, the reasonings appear more manifest, —we advance more easily, until at length we are able, without overlooking anything of importance, to read with a velocity which appears almost incredible for those who are only commencing the study.

Fourth Rule.

The Fourth Rule under this head is—"Regulate on the same principle the extracts which you make from the works you read.

So much for the Unilateral Communication of thought, as a mean of knowledge. We now proceed to the Mutual Communication of thought,—Conference.

Conference,—of two kinds.

This is either mere Conversation,—mere Dialogue, or Formal Dispute, and at present we consider both of these exclusively only as a means of knowledge,—only as a means for the communication of truth.

1. Dialogue.

The employment of Dialogue as such a mean, requires great skill and dexterity; for presence of mind, confidence, tact, and pliability are necessary for this, and these are only obtained by exercise, independently of natural talent. This was the method which Socrates almost exclusively employed in the communication of knowledge; and he called it his *art of intellectual midwifery*,

because in its application truth is not given over by the master to the disciple, but the master, by skilful questioning, only helps the disciple to deliver himself of the truth explicity, which his mind had before held implicitly. This method is not, however, applicable to all kinds of knowledge, but only to those which the human intellect is able to evolve out of itself, that is, only to the cognitions of Pure Reason. Disputation is of two principal kinds, inasmuch as it is oral or written; and in both cases, the controversy may be conducted either by the rules of strict logical disputation, or left to the freedom of debate. Without entering on details, it may be sufficient to state, in regard to Logical disputation, that it is here essential that the point in question,—the *status controversiæ*,—the thesis, should, in the first place, be accurately determined, in order to prevent all logomachy, or mere verbal wrangling. This being done, that disputant who denies the thesis, and who is called the *opponent*, may either call upon the disputant who affirms the thesis, and who is called the *defendant*, to allege an argument in its support, or he may at once himself produce his counter-argument. To avoid, however, all misunderstanding, the opponent should also advance an antithesis, that is, a proposition conflictive with the thesis, and when this has been denied by the defendant the process of argumentation commences. This proceeds in regular syllogisms, and is governed by definite rules, which are all so calculated that the discussion is not allowed to wander from the point at issue, and each disputant is compelled, in reference to every syllogism of his adversary, either to admit, or to deny, or to distinguish. These rules you will

2. Disputation,—Oral and Written. Academical disputation.

find in most of the older systems of Logic; in particular I may refer you to them as detailed in Heerebord's *Praxis Logica*, to be found at the end of his edition of the *Synopsis* of Burgersdicius. The practice of disputation was long and justly regarded as the most important of academical exercises; though liable to abuse, the good which it certainly ensures greatly surpasses the evil which it may accidentally occasion.

THE END.

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AN ESSAY

ON THE

NEW ANALYTIC OF LOGICAL FORMS.

a

J. Sewite

AN ESSAY

ON THE

NEW ANALYTIC OF LOGICAL FORMS,

BEING THAT WHICH GAINED THE PRIZE PROPOSED BY SIR WILLIAM HAMILTON, IN THE YEAR 1846, FOR THE BEST EXPOSITION OF THE NEW DOCTRINE PROPOUNDED IN HIS LECTURES;

WITH

AN HISTORICAL APPENDIX.

BY THOMAS SPENCER BAYNES,

TRANSLATOR OF THE PORT-ROYAL LOGIC.

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PREFACE.

THE following Essay was written exclusively from the notes which I took while attending SIR WILLIAM HAMILTON'S class in 1845-6, that being the only session during which I ever attended his logical course as a student.

It has thus a certain value, though this be but slight,* as evidence that SIR W. HAMILTON then taught his new doctrine so clearly, that it might be readily apprehended in all its essential points by an ordinary student. In order, therefore, that it may not lose any accidental value which it possesses on this account, the Essay is published as it was originally written. I should not, indeed, have felt myself at liberty, even on other grounds, to have altered it. Accordingly, with the single excep-

* Were it necessary, abundant evidence might be at once obtained to prove that Sir W. Hamilton taught his new doctrine five years earlier than the above date.

tion of a somewhat fuller statement of the three canons of figure, (pages 67, 68,) it is printed without alteration, as at first given in for competition. A few foot-notes have been added while it was going through the press. These are distinguished from the original notes of the Essay by being placed within brackets. Some historical details, too, touching the doctrine which the Essay expounds, have been given in the form of an Appendix. These details, though presenting little attraction to those who have only a general acquaintance with logical science, will, I hope, be found of some interest to its more advanced students.

The few definitions and canons which occur through the Essay, and which are marked with inverted commas, are given from my notes of the lectures. They are, I believe, substantially correct; but as the notes are in many places brief and imperfect, I cannot vouch for their verbal accuracy. The requirements originally prescribed for the Essay are reprinted with it, as they to some extent explain the form which it assumed.

Although at the time when the prize was awarded Sir William Hamilton had suggested to me that

the Essay was of sufficient general interest for publication, still I naturally felt that, in the event of being printed, it would be more satisfactory, both to the public and to myself, to receive some formal confirmation of this. Indeed, as the Essay is mainly devoted to the exposition of SIR W. HAMILTON'S new doctrine, I should not, for a moment, have entertained the idea of publishing it at all without his express sanction. Accordingly, when I first thought of doing so, I applied to SIR W. HAMILTON for this purpose, and received from him the following note, for the kindness of which, I need scarcely say, I feel personally indebted :—

"EDINBURGH, *9th March*, 1850.

"MY DEAR MR. BAYNES,—So far from having any objection to the publication of your Logical Essay, the intention has my fullest approval. When I first perused that Essay, it seemed to me, not only pre-eminently entitled to the annual prize for which it was written, but well deserving of the attention of logical readers in general. This I probably expressed to you at the time. And having now obtained all the highest honours in Philosophy proper which our University offers to her Alumni, I am happy to learn that you propose printing that Essay, in its original form, with the addition of relative

matters furnished by your subsequent thought and reading. I am acquainted with no one who has more zealously—more unexclusively followed out his philosophical and, in particular, his logical researches; your supplement cannot, therefore, fail to be at once curious and important. I would say, that any information from me is at your service, were I not aware that you are laudably desirous to limit your additions to your own resources. I shall only request the annexation of a note, principally for the purpose of showing in what respect my present views may differ from those of mine stated by you in the Essay.* —Believe me," &c.

I have only further to return my best thanks to Sir W. Hamilton for his constant kindness in facilitating my inquiries, giving me free access to his library for works which I could not otherwise have obtained, and in various other ways affording me the benefit of his invaluable counsel and assistance.

THOS. S. BAYNES.

Edinburgh, *May* 23, 1850.

* See Note by Sir William Hamilton, p. 153.

REQUIREMENTS

FOR

ESSAY ON THE NEW ANALYTIC OF LOGICAL FORMS.

Without wishing to prescribe any definite order, it is required that there should be stated in the Essays :—

1° What Logic *postulates* as a condition of its applicability?

2° The reasons why common language makes an *ellipsis* of the *expressed quantity*, frequently of the *subject*, and more frequently of the *predicate*, though both have always their quantities in thought.

3° Conversion of propositions on the *common* doctrine.

4° Defects of this.

5° *Figure* and *Mood* of Categorical Syllogism and *Reduction*,— on *common* doctrine. (General Statement.)

6° Defects of this. (General Statement.)

7° The one *Supreme Canon* of Categorical syllogisms.

8° The evolution from this canon of all the *Species* of Syllogism.

9° The evolution from this canon of all the *General Laws* of Categorical Syllogisms.

10° The error of the *Special Laws* for the several Figures of Categorical Syllogisms.

11° *How Many Figures* are there?

12° What are the *Canons* of the *several Figures?*

13° *How many Moods* are there in *all* the Figures; showing, in concrete examples, through all the Moods, the *unessential* variation which Figure makes in a Syllogism?

14° What relation do the figures hold to *Extension* and *Comprehension?*

15° Why have the *second* and *third* Figures *no determinate major* and *minor premises*, and *two* indifferent *conclusions;* while the *first* Figure has a *determinate major* and *minor premise*, and a *single proximate conclusion?*

16° What relation do the Figures hold to *Deduction* and *Induction?*

April 15, 1846.

NEW ANALYTIC OF LOGICAL FORMS.

THE main principle on which the new Analytic of Logical Forms proceeds is that of a thorough-going quantification of the predicate. This principle in its full scientific significance has been totally overlooked by logicians; and when noticed at all, has for the most part been referred to only to be discarded as useless, if not to be condemned as false.* In conse-

* Dico, signum esse addendum subjecto, nunquam prædicato. Si enim in propositione universali affirmativa signum universale addas prædicato, falsa erit propositio: ut "omnis homo est omne animal." Si vero in universali negativa signum universale, itemque particulari, sive affirmativa fuerit sive negativa, signum particulare addideris prædicatis, propositiones non quidem falsæ fient, sed tamen efficies redundantiam et ταυτολογίαν. *Doctrina Propositionum Disputationibus*, xii. *comprehensa*. à M. Daniele Stahlio. Oxon. 1663. (Disputatio vi. § 16.)

[This is the tradition touching the express quantification of the predicate almost universally prevalent in the Aristotelic schools and commentaries, as will be more fully shown in the Appendix. The *Regulæ Philosophicæ* of Stahl, however, from which it is taken, is an acute and valuable work, faithful to its title, and containing more learning and philosophy than could readily, even in the works of his

quence of this omission, logic as a formal science has received only a one-sided development—has been deprived of much that is scientifically true—encumbered with much that is scientifically false; and

time, be found within the same compass. It long maintained a very high reputation, and was often reprinted, both on the continent and in this country. The first edition was published in 1635, the second in 1641, another in 1653. Several others followed, which were reprinted at London and Oxford; and finally a revised edition appeared in 1676, with notes by the elder Thomasius, who was the master of Leibnitz. From having thus ascertained more accurately the dates of the earlier editions of this work, I can now state with confidence what I had before surmised, viz., that it contains at least a partial anticipation of the distinction which was for the first time fully taken and established in modern philosophy by the Port-Royal logicians,—the distinction, to wit, in notions of the two wholes or quantities, the *comprehensive* and the *extensive*. In answer to the question, how the wider predicate comes to be in its narrower subject; or, what is the same thing, how the whole essence of the genus comes to be in the species; the author says, "Esse prædicatum in aliquo subjecto totum seu universaliter potest dupliciter accipi: primo, *intensive* seu *ratione essentiæ*, et sic animal totum inest homini, et sic quodvis prædicatum superius inest inferiori: secundo, *extensive*, seu *ratione latitudinis* ut hic accipitur, et sic animal non inest totum seu universaliter in homine, quia animal non totum comprehenditur ab ipso, ita ut extra ipsum non sit." (*Reg. Phil.*, p. 687.) The contrasted character of these counter quantities, the intensive, as the *quantity of essence*, the extensive, as the *quantity of extent*, is here given with even scientific precision. Many of the older logicians say in general, (after Aristotle,) that in one sense the species is in the genus, and in another the genus in the species; but I have not found any statement of this distinction before the time of the Port-Royalists at all so precise and explicit as that given in the above passage. Daniel Stahl, beside the *Regulæ*, was the author of a number of other works on Logic, Metaphysics, and Ethics. He was professor of Philosophy in the University of Jena, and died in the year 1654, after having occupied the chair thirty-one years. (*Witteni Memoriæ*, p. 166.)]

throughout its entire history exhibited in a perverted and erroneous form. On the principle of a quantified predicate, however, past evils are corrected, past omissions supplied; and logic receives its highest development in the perfection and simplicity of its form. To exhibit some of the more immediate improvements thus effected by the application of this principle is the design of the following essay. In seeking to accomplish this there will be;—

I. A statement and application of the fundamental postulate of logic, from which application there arises the principle of an expressed quantification of the predicate.

II. The application of this principle (of a quantified predicate) to propositions; and in particular to the doctrine of their conversion, in which the complexity and incompleteness of the old doctrine will be contrasted with the simplicity and perfection of the new.

III. The influence of this principle on the doctrine of categorical syllogisms, in contributing to effect specially; the reduction of their general laws to one; the abolition of their special laws; and from this new simplicity the amplification of the valid forms of reasoning.

[It may, perhaps, be well to state at the outset that in the following essay, when not otherwise stated, we proceed in the whole commonly recognised by logicians—the whole of Extension; understanding,

however, that by changing the copula in propositions, and accompanying this change by a transposition of the propositions in syllogisms, what is said of the one whole of Extension is equally applicable to the counter whole of Comprehension.]

We proceed then—

I. *To state and apply the fundamental postulate of logic. This postulate is,—"That we be allowed to state in language what is contained in thought."*

The application of this postulate to the subject of a proposition is not denied. Logicians *now* universally allow that the subject has a determinate quantity in thought, and this is accordingly expressed in language. With the subject of a proposition we have here, therefore, nothing to do. It is to the predicate that we have to vindicate an interest in the postulate co-equal with that of the subject.

In order to determine this, we must inquire whether a notion holding the place of predicate in a proposition always has a determinate* quantity in thought.

* In order to obviate mistake, we may say that we use the word "*determinate*," in relation to quantity, generically, as including under it *definite* (universal or individual) *and indefinite* (particular). In this sense it is simply opposed to that absence of all expressed quantity which logicians have generally represented by the term *indefinite*. We do not know whether such usage be strictly correct, but adopt it for the sake of convenience.

If it have, then the postulate has an immediate application, and this quantity must be expressed.

In answering this question we shall show—

i. *That the predicate always has a determinate quantity in thought: and* ii., *Explain the reason why this quantity is not generally expressed in common language.*

We proceed to show then—

i. That a notion holding the place of predicate in a proposition always has a determinate quantity in thought.

That this is the case will appear from a little consideration of what a notion is. "A notion or concept"* is defined to be "the cognition or idea of the

* [As this term has fallen out of use, it may be necessary to say a word or two in explanation of its recall. It is employed by Sir W. Hamilton to discriminate in conception the *product* from the *process*. The meaning of the term conception, as commonly used, is ambiguous, since it is employed to denote both the *act* of conceiving and the *product* of that act. The correlative term *concept* removes this ambiguity, since it designates exclusively the product, while the term *conception* is restricted to denote the act of conceiving. It need scarcely be added that these terms are here employed according to their true etymological and scientific meaning, to denote the acts and products of the comparative, and not those of the representative faculty.

We said advisedly that this term had "fallen out of use," inasmuch as it was commonly employed by the older English writers on Logic in its precise scientific significance, to express those generalisations represented by common terms, which are the ultimate elements of logical analysis, and with which the first part of logic has mainly to do. Thus Coke, speaking of first and second notions, says—"Those that primarily imposed names intended to name first the things

general attribute or attributes in which a plurality of objects coincide." This obviously involves the perception of a number of objects—their comparison—the recognition of their points of similarity—and their subjective union by this common attribute. The

themselves, as the word *man* is to express primarily the *conceit* which we form of human nature." Again, "Now the second notions do not directly and by themselves shadow out unto us the things themselves, nor anything accidental or appendant unto them, but point out certain intellectual rules whereby we do with all distinctness and regularity form things, that is the *conceits* of things." (*Art of Logick*, p. 11.) And again, speaking of the various relations of words, he says quite explicitly—"The formal is the signification of the word, and by consequence the relation to the *conceit* of the mind which it giveth knowledge of." (P. 15.) Fraunce also uses the term continually. Thus, to take a single example in defining an axiom, he says, "It here signifieth any sentence or proposition whatsoever wherein one argument, reason, *conceipt*, thing, is so conjoined with, or severed from another, as that thereby we judge the one eyther to bee or not to bee, the cause, effect; whole, part; generall, speciall; subject, adjunct: divers, disparate; relative, repugnant; like, unlike; equall more or less to the other." (*Lawyer's Logick*, fol. 87.) See another instance of this use from Fraunce in the quotation given at p. 23 (note). The term is also used by Granger in his "Divine Logick;" and, if I remember aright, by Wilson in his "Rule of Reason." It is to be found, too, employed in the same sense out of logical works, and is used in this way by writers of authority; we may specify as examples among others Dr. Henry More, and Sir W. Raleigh. All that now remains to us of this old use is the restricted sense in which the word *conceit* is employed—a sense at once so restricted and so established as to unfit it for scientific use. *Concept*, as strictly analogical in form and precise in meaning, is exactly the term we need to express the simplest products of the comparative faculty; and, as we have shown, it already exists in the language. What is necessary, therefore, in employing it, is not an apology for its introduction, but simply a vindication of its recall.]

possibility of this process determines the possibility of knowledge to man. Had he no power of classifying in intellect the confused multitude of objects presented in sense, he must remain for ever destitute of anything worthy of the name of knowledge. With no clear recognition even of the individual, since comparison and discrimination would be impossible, he must for ever abide amidst the obscurity and vagueness in which knowledge commences—helpless amidst a multiplicity of objects which he could not comprehend—bewildered by a confusion which there was no possibility of recalling to order. The earliest effort of the mind is accordingly directed to extricate itself from this confusion ; and this determines the exercise of the comparative faculty, and the formation of concepts or notions.

Amidst the multitude of confused objects presented to the mind in perception, some are found to affect us similarly in certain respects. These objects the mind considers ; by comparison it recognises their resembling qualities ; by attention these are exclusively considered, since the concentration of the mind on those qualities in which objects coincide involves of necessity its abstraction from those in which they are severally dissimilar. These various objects, since the resembling attributes which they possess in common cannot, when considered alone, be discriminated, are, in this restricted point of view, considered as one. In other words, the mind grasps into

unity a multitude of objects severally distinct by a common point of identity. On this unity thus formed it sets the seal of a name, that it may be enabled ever afterwards at once to discriminate the various objects of its knowledge, commodiously refer each to its own class, and thus be saved the endless labour of enumerating all the particulars by which objects are individually discriminated. A notion is thus a purely ideal or subjective whole, which the mind from the limitation of its powers is necessitated to form, in order to classify in thought and discriminate in language the various objects of its knowledge.

This being the case, it is obvious that a concept or notion can afford only a partial knowledge, and has only a relative existence. It can afford only a partial knowledge, since it embraces some only of the many marks by which an object is known. It has only a relative existence, since this knowledge is not given absolutely, but only in connexion with some one of the objects to which the concept is related. For a notion, though potentially applicable to all the objects which it contains, can only be truly known on occasion of its being actually applied to some one of these objects. This is at once the test and the evidence of its relative character. And this being its character, it is obviously altogether dependent on the objects from which it is formed. A notion has thus, in its totality, a purely subjective existence, destitute of any objective reality. Being what it is

—an ideal whole only by relation to the objects whose resembling part it embraces—it is obvious, as we have said, that it can pretend to no independent existence, much less to any independent knowledge. Its existence entirely depends on that of the objects from whence it is derived, and to each of which it is linked by the common resembling attribute which it embraces. Destroy the objects, you destroy the resembling attributes in each; and destroying the resembling parts, you annihilate the whole which they together constituted. As, however, a concept has only a subjective being, existence and knowledge are here identical. If no qualities be discriminated in objects as similar, we have no knowledge of a concept—no concept exists. If we cannot assign an object to any class—cannot say it does or does not belong to any notion, we do not comprehend it. We think an object (recognise to be what it is) only as we think it under some notion or concept.

This being premised with regard to notions in general, it will be seen, that when we bring an object under a notion, *i.e.*, when we predicate of it that it belongs to such a class, we must know that it occupies a certain place in that class. For if we were uncertain what place the individual object occupied in the class, or whether it occupied any place at all, we should not know the class, and could not, therefore, bring any object under it;—*e.g.*, If I do not know whether *rose* comes under the concept *flower*

—whether it is equal to some part, or the whole, or superior to it—I do not know the class *flower*, and cannot, of course, predicate flower of rose; in other words, I cannot bring *rose* under the concept *flower*, since I do not know what the concept means, what it contains, and what it does not. This is clear; for as we have just explained—since a notion, as a factitious unity in thought, is absolutely worthless, and, indeed, not cognisable, out of relation to the individual objects, the aggregate of whose resembling qualities it constitutes; and since an object is truly known only as it is thought through or under a notion, it follows, that comprehension, in such a case, would be impossible. If, therefore, we understand the object at all, we must fix, in thought, the sphere which it occupies under the class to which, in predication, we have assigned it. In other words—if we comprehend what we utter, *every notion holding the place of predicate in a proposition must have a determinate quantity in thought.*

This, indeed, is always involved in predication. For predication is nothing more or less than the expression of the relation of quantity in which a notion stands to an individual, or two notions to each other. If this relation were indeterminate—if we were uncertain whether it was of part, or whole, or none—there could be no predication. The very fact of predication is thus always evidence that the predicate notion holds a relation of determinate

quantity to the subject. In other words, we think only as we think under some determinate quantity; for all thought is comparison of less and more, of part and whole. All predication is but the utterance of thought. All predication must, therefore, have a determinate quantity.

Since, therefore, the quantity always exists in thought, the postulate applies; that is, in logic the quantity must be expressed, on demand, in language.

It only remains to remark here, that this quantity of the predicate notion, always determinate, will be *definite*, (universal or individual,) or *indefinite*, (particular,) as the subject notion is greater, equal to, or less than the predicate. If the subject notion be less, we attribute to it a part only of the predicate—say it is some part, but not the whole, which that notion comprises, *e.g.*, "*all man is some mortal.*" If the subject be equal to the predicate, we attribute the whole notion to it, *e.g.*, "*all man is all rational.*" If the subject be greater, we attribute the whole predicate to it, as a part only of its extension, *e.g.*, "*some mortal is all man.*"

Logicians who have occasionally touched upon the quantification of the predicate, seem for the most part to have conceived the possibility of its express quantification only universally;* and because this

* Notandum, signum universalitatis non esse apponendum prædicato, sed tantum subjecto; rectè enim dicitur, "*omnis homo est animal;*" sed non rectè dicitur, "*omnis homo est omne animal.*"

cannot be done in a great number of cases—in all those cases, indeed, in which an individual is brought under a concept, or a species under a genus, (as we cannot say, "all man is all mortal,")—since this cannot be done, to have lightly thereupon thrown aside the whole doctrine as of no avail. It is, however, clear, from the nature of a notion as a whole made up of the like characters in a number of objects which thus stand to it in the relation of parts, that we are quite as much at liberty to say of one of these objects, that it forms a part of the notion, as we are to say of all the objects together, that they constitute the whole.* We may, therefore, and in

Verum duæ limitationes adhiberi possunt: Prima, ut intelligatur de universalibus affirmatis non autem de negatis; recte enim dicitur "*omnis homo est nullus asinus*," "*nullus asinus est omnis homo*:" Secunda, ut signum universalitatis immediatè ponatur ante prædicatum; nam si apponatur tantùm adjuncto prædicati, enunciatio non erit falsa, ut "*visus percipit omnem colorem*," "*Christus curabat omnem morbum*," &c. Quia adjunctum ejusmodi poterit fieri subjectum, mutando verbum activum in passivum hoc pacto, "*omnis color percipitur a visu.*" *Davidis Derodonis Logica Restituta.* Geneva, 1659. (Page 573.)

On the catholic doctrine held by logicians touching the quantification of the predicate, see the Appendix.

* [The older logicians laid down many rules which were often useless, sometimes false, and at best of only partial and limited application, about what they termed the regular and irregular order of predication—the natural or unnatural, direct or indirect, consecution of the terms in a proposition. Natural, or regular, or direct predication (*predicatio naturalis, directa, ordinata*) they held to be that in which the genus is predicated of the species, the species of the individual, the attribute of its subject, and in general the exten-

fact we must continually quantify the predicate particularly.

sive whole of its part; and in which, therefore, the subject notion was always of less extent than the predicate notion. Unnatural, indirect or irregular predication (*predicatio non naturalis, indirecta, inordinata*) was the reverse of this, that, to wit, in which the species was predicated of the genus, the subject of its attribute, and in general the extensive part of its whole.

Language is, however, but the instrument of thought; and its natural order in the last resort must ever be that in which it best expresses the thought of which it is the vehicle. What this order shall be will thus in great measure be determined by the feeling and purpose of the speaker. If he have a special interest in any particular term, or wishes in any way to make it emphatic, it will occupy the more prominent and important place in the proposition. The order in such a case will be that of interest and emphasis, and this surely is as natural an arrangement as any other. Accordingly, if I wish to direct particular attention to the genus, it may stand first in the proposition, and the species follow as its predicate. Thus, for example, if referring to the Scaligers I were to say, "An acute philosopher was the father, an erudite philologer the son," there would be nothing unnatural in this, for by such an arrangement of the terms, I simply direct special attention to the different departments of science in which they respectively excelled. So, again, in the line of the poet, "The proper study of mankind is man;" and in a number of other examples that will readily suggest themselves. With equal justice, if I wish to make the species (or genus) emphatic, I may predicate the individual of it, *e.g.*, in the expressions, "A philosopher, indeed, was Socrates;" "The poet of all time is Shakspeare;" there is nothing unnatural, but attention is appropriately directed to the high type of poetic and philosophic character which respectively belonged to these great men.

It is no valid objection to this form of predication to say, that in all such cases we do in reality so restrict the genus or species, that they become convertible with the species or individual severally predicated of them; for this objection lies equally against all predication whatever. Thus, in what is termed the regular form, the genus is never

We proceed then—

ii. To explain why the quantity of the predicate is not expressed in common language.

We have already explained the nature of a con-

taken in the whole of its extent, but only in so much of it as is occupied by the species of which it is predicated, *e.g.*, when we say, "All man is animal," we do not of course mean *all* animal, but simply that *part* of animal which is convertible with man, or as is sometimes more explicitly stated, "Man is an (one) animal," or, (if referring to the race,) "a species of animal."

So, again, in relation to the second division of what is called unnatural predication—that in which the subject is predicated of its attribute—if we wish specially to signalise the attribute that will naturally stand first, *e.g.*, in the exclamation, "Great is Diana of the Ephesians," the greatness of Diana is far more emphatically marked than it would be if the terms were reversed. So, again, in the line, "The fairest of her daughters, Eve," it is to the beauty of Eve that special attention is directed.

It may be at once conceded to the logicians, that what they have termed the natural or direct order, is the more common, inasmuch as the concrete terms of a proposition are generally of greater interest than the abstract ones; but it is unjust to speak of any other order of predication as unnatural or unlawful, while it is quite obvious that, logically considered, either order of consecution in the terms of a proposition is equally valid, for we may indifferently predicate a part of the genus of the whole species, or the whole species of a part of the genus. This liberty, indeed, is not denied, though it is generally, nevertheless, even by late writers, allowed as an exception rather than as a rule. Thus Gassendi, after giving the rule that the species cannot be predicated of the genus, says, in mitigation of its force—"Additur nihilominus, *nisi generi limitatio adhibeatur;* dicere enim possumus, ut jam ante insinuatum est, *aliquod animal est homo; certus quidam color est candor; una quæpiam virtus est justitia.* Efficitur nempe, ut particulis hujusmodi limitantibus genus veluti contrahatur, neque amplius pateat, quam species; ac proinde ut species de eo enunciari, fierive illius attributum reciproce possit." (*Logica.* Oxon. 1718, p. 367.)]

cept—that it is a factitious whole obtained from a number of individual objects, each of which, therefore, occupies a certain part of the whole concept. We have also shown, that this relation of quantity is always present to the mind, when a concept and an individual (or a part and whole of any kind) are thought together as subject and predicate. Though always thus contained in thought, this quantity is, however, rarely expressed in ordinary language. The name in which the totality of attribute embraced by the concept is fixed, is usually applied to any one of its individual objects, without any particle of quantification. The explanation of this omission is to be found in the end which common language seeks. The end which it proposes to itself is the clear utterance of meaning; it seeks to render at once intelligible, by its signs, *the thing signified.* As a vehicle for the conveyance of thought, ordinary language is mainly concerned about *what is thought*—not the *manner of thinking it.* In other and more technical terms, it is primarily engaged with the *matter of thought*, and only considers the *form* incidentally, and as a mean to an end. Whatever, therefore, is not really necessary to the clear comprehension of what is contained in thought, is usually elided in expression. Thus common language abounds with abbreviations and elliptical forms of expression. The expression of those phases of thought and feeling which arise in conjunctions of

circumstances which are frequent and familiar, are almost always and conveniently of this description, *e.g.*,—we meet a friend and say, "*good morning.*" What is intended here? A cordial greeting and the expression of friendly feeling. This, however, is not expressed in terms, but the elliptical form above is understood to represent, "I wish you a good morning." So also in "farewell," and a multitude of other cases which might be adduced. In fact, so that what is meant by it be at once clearly intelligible, an expression, however elliptical, is true and valid for all the purposes of ordinary language. Thus, to facilitate the communication of thought, not only are words omitted, but the steps of the reasoning process itself are for the most part abbreviated. Common language almost invariably makes an ellipsis of one step of this process. For since the reasoning process is the same in all men—being governed by laws necessary and universal—the mind at once and intuitively supplies the omitted step, and the process is complete. This principle, too, affords the true explanation why, in common language, the overt quantification of the predicate is neglected. It is not necessary for the clear comprehension of a proposition that the predicate be quantified in terms. And the reason why this is not necessary is to be found in the universality of generalisation or the formation of concepts, and the sameness of the process in all men. All men must generalise, for the

necessity which determines this process exists in all. All men must generalise alike, for the faculties which accomplish it are the same in all. In order to comprehend the many objects by which he is surrounded, he must reduce them to order. To accomplish this, he classifies or groups into unity a number of objects which affect him in the same manner. But as the same objects affect all men in the same manner, it follows, that where the same term exists to express the same mental modification, this term may and will be applied to all the individual objects which determine such similar impressions.

As all men, therefore, know what is meant by a general term,—that it is a name equally applicable to all and each of the individual objects which it embraces, when one of these objects is brought under it; that is to say, when it is predicated of this object that it forms a part of the notion which the general term expresses, it is not absolutely necessary overtly to declare that it forms only some part; for as it is universally known that the concept is of far wider extension, the quantity is immediately supplied in thought, and no mistake arises. Thus, when we say, "*Every horse is an animal*"—"*All men are mortal*," it is not necessary to say that there are other animals besides horses, or to guard explicitly against the conclusion that man alone is mortal; for as the extension of the general terms is understood by all, every one knows at once, by a reference to the matter

of the thought, that in each case the predicate is affirmed of its subject only in *some part* of its extension, not in the whole.

Since, therefore, it is not necessary, for the clear understanding of a proposition, that the predicate notion be expressly quantified, and as the continual repetition of it would be wearisome, the quantification is usually omitted; in other words, *since it is not necessary for the purposes which ordinary language seeks to accomplish, the quantity of the predicate, though always contained in thought, is usually elided in expression.*

All this, however, becomes widely different when in the progress of reflective inquiry a science arises, which seeks, as its express aim, to accomplish a full and final analysis *of the form of thought.* It will be the office of such a science to supply for its own purposes the omissions of common language—to restore whatever of the form of thought may have fallen out of expression in ordinary parlance. The procedure of logic and that of common language are thus different, and to some extent opposed; the former recalling to expression as of scientific value what the latter had thrown aside as of no account. The different nature of their procedure is, as we have hinted, determined by the different nature of the ends which they respectively seek to accomplish. Common language, as we have seen, seeks as its end to exhibit with *clearness the matter of thought.* What-

ever does not contribute to this is thrown aside as worthless. Logic, on the other hand, seeks as its end *to exhibit with exactness the form of thought.* Whatever contributes to this is retained as of scientific value. All the elements which the analysis of the form of thought furnishes must be brought out to view, and explicitly considered. Whatever does not belong to the form of thought must be cast aside as without the province of the science. We have seen, that in thought the predicate notion of a proposition is always of a given quantity. This quantity is not expressed in common language ; because, by a knowledge of, and reference to, the matter of thought, the omission is at once supplied. This procedure is, however, of course incompetent to logic. As a formal science, it knows nothing of the matter of thought ; it makes no elisions ; it can understand nothing ; it can supply nothing ; it can only recognise and deal scientifically with what is given formally. If, therefore, the predicate has always a certain quantity in thought, (and we have shown it has,) that quantity must be expressed before it can be logically taken into account, and its significance investigated. The recognition of the expressed quantity of the predicate is then as imperative in logic as the neglect of such recognition is convenient in common language ; for it is plain that, unless all the elements furnished by analysis be received and considered in their relative influence and importance, the

science cannot pretend to completeness. Logic, in common with all sciences, seeks perfection; but, as a formal science, it can only realise scientific perfection as it attains to formal exactness. The condition of its formal exactness is, that its analysis of the form of thought be exhaustive and complete. As soon as this is the case, synthesis may commence, and the science will emerge in its full beauty and true perfection.

This explains how it is that logic has remained so imperfect and deformed in the hands of all previous logicians. They were, in the main, right as far as they went; but they did not go far enough. Their investigation of the form of thought was arrested before it had attained the necessary completeness. Proceeding in their analysis, they correctly recalled to expression what common language had omitted in the reasoning process, and exhibited the three steps of that process in their formal order and completeness. Still continuing their analysis, they proceeded to investigate the properties of a proposition in order to determine its scientific capabilities. Here they discovered that the subject has always a certain quantity in thought. This quantity, in conformity with the necessities of their science, they accordingly expressed, and turned to scientific account. But here their analysis was stopped, just at the very point the investigation of which would have conferred upon their science the completeness which it lacked;

and, as the natural result of a defective analysis, logic, as a science, has always remained incomplete. Had logicians proceeded further, they would have discovered that a determinate quantity always belongs, not only to the subject of a proposition, but also to the predicate; that the recognition of this quantity in logic affords an important principle, the true application of which would relieve it of its many inconsistencies, and confer upon it scientific perfection. It will be our business presently to inquire into some of the improvements thus effected.

To recapitulate, then:—We have seen, from the nature of a notion in general, and of a predicate notion in particular, that it always has a determinate quantity in thought. We have thus vindicated to it an interest in the fundamental postulate of logic. And from the application of that postulate there has emerged the principle—*That the quantity of the predicate notion of a proposition be explicitly noted in logic.*

We proceed now to show—

II.—*The application of this principle to propositions, and in particular to the doctrine of their conversion.*

A proposition is defined to be "the expression in language of the relation of congruence or confliction, in which two notions, two individuals, or an individual

and a notion, (in a word, two terms,) are recognised, when compared together, to stand to each other." *

This being the nature of a proposition, it is evident that it involves a plurality of ideas,† thought together in mutual relation and dependence; since it is only by being viewed in relation as subject and predicate, determining and determined, that a plurality of thoughts can be reduced to a mental oneness, and recognised together in the same individual act of consciousness.

The terms of a proposition are thus always related, and this relation constitutes their scientific significance. To investigate this relation fully, and determine it exactly, is the office of logical analysis. As a proposition is the expression of the relation of congruence or confliction between two thoughts, it is surely of the highest importance—in fact, a condition of its intelligible existence—that the amount of this agreement or difference be known and stated. This can only be done by ascertaining the quantity of both the terms, and thus determining the space of each in relation to the other. Until this be done, the properties of a proposition have not been fully analysed; its scientific capabilities cannot be fully determined. The quantity of the terms in relation

* "*Judicium* est comparatio ideæ cum idea; *propositio* est judicium terminis expressum."—*Ploucquet.*

† Using the term "idea" generically, to include the products of sense, imagination, and intellect.

to each other is thus the most important aspect in which a proposition can be considered ; but though thus the most important relation, it is one in the analysis of which logicians in general seem to have been more than commonly unsuccessful. In opposition to the obvious importance and necessity of determining the quantity of the terms in a proposition, they have introduced into logic a class of propositions distinguished by the absence of all quantity;* and this, too,

* [The class of propositions distinguished by the absence of all expressed quantity, and termed by logicians *indefinite*, (more properly *indesignate*,) affords another curious illustration of how completely the force of authority has in logic prevailed over the most obvious and elementary necessities of the science. Introduced originally by Aristotle, and subsequently reproduced by Boëthius, these propositions have continued to occupy a place in the science, and to be discriminated as a separate class, under the division of quantity. In the absence of all expressed quantity, however, it was very difficult to turn them to any logical account. Some kind of quantity was necessary for this purpose ; but the only way in which they could be quantified with any certainty was *particularly*, according to the caution of Apuleius, who says, referring to the division of propositions under the head of quantity, " Aliæ indefinitæ, ut *animal spirat*, non enim definit utrum omne, an aliquod. Sed tamen pro particulari semper valet. Quia tutius est id ex incerto accipere quod minus est." (*De Syllogismo Categorico. Apuleii Opera.* Lugd., 1600, p. 415.)

Subsequently, however, as stated in the text, rules for determining this quantity were laid down, derived from the object-matter of the propositions themselves. By Ramus, indeed, and some of his followers, indefinites, it would seem, were altogether rejected as of no logical account. His English representative, Fraunce, (I have not Ramus' own works at hand,) says, referring to the indefinite proposition, " But Ramus expelleth that uncertaine and indefinite axiom; for every conceipt of the mind is determinatly eyther generall or

in opposition to the fundamental postulates of their science :—that in order to deal with a proposition we must know what it means—*i.e.*, understand the quantity of its subject and predicate—and that we be

speciall, and speciall eyther particular or singular." (*Lawyer's Logike*, fol. 92.)

They continued, nevertheless, to be currently received, and a later English writer but reflects this common acceptance when he makes them the matter of special legislation. " The canons hereof," says Coke, speaking of this class, " are two." He then gives the following, which are, however, but translations and abridgments from Keckermann :—

" 1. The chief force and use of indefinites is in propositions of the idea : that is in such as where the universal subject is taken absolutely, as—the Lord's Supper is a sacrament ; man is the noblest creature ; the soul of man is immortal, &c.

" 2. There is also a use of indefinites to signifie that the consequent is in the antecedent, for the most part, though not always, ὡς ἐπὶ τὸ πολύ. As, the *Cretians* be lyars ; mothers are too much cockerers of their children," &c. (*Art of Logick*, p. 106.)

A recent British writer, however, sees far more clearly into their true logical character and relation, and says of them, (referring to the rules which are given for their reduction,) with far more scientific than historic truth, " By reduction here is to be understood that logicians recognise no indefinite propositions, and that if an indefinite occur, they require it to be expressed in a definite form. Indefinite propositions are noticed that the logician should be on his guard against them, and not because they are legitimate, or of any legitimate class." (*Thynne's Compendium of Logic.* Dublin, 1827, p. 47.)

This is far from being historically true, and if it were, it would not avail to defend the position which indefinites occupy ; for the principle of their reduction is as extra-logical as are the propositions to be reduced. In the statement, that they are not recognised in logic as a separate class, this author has at once overrated the acuteness of his predecessors, and underrated his own ; for it is only within a comparatively short period that their logical position has been seri-

allowed to express all that is understood. As an antidote to the disorders thus introduced into their science, they have had recourse to an extra-logical remedy ; that is to say, they have laid down a number of rules for determining the quantity of these unquantified propositions, founded on the object-matter of these propositions themselves, according as this matter is possible or impossible, necessary or contingent. In so doing they have, implicitly at least, destroyed their science ; for if logic be competent to this discrimination, it can no longer vindicate to itself the character of a special science, but must become co-extensive with the whole domain of human knowledge. They have thus also destroyed the possibility of its thorough-going application, since they have tacitly laid down, as a preliminary to such application, the impossible condition that we should

ously called in question. They are, however, as need scarcely now be stated, to be rejected from logic as utterly unscientific in their character. They belong, indeed, to the same confusion of the accidental with the essential, through which the enthymeme was discriminated as a separate form of reasoning. In both the mere *contingencies of speech* are identified with the *necessities of thought;* and the *accidents of expression* are received and incorporated with the science as valid *elements of form.* Science, however, is no longer worthy of the name when it accepts and incorporates, without examination, the rude materials which it is its office to elaborate ; and places among its elements the confused wholes, which a more searching analysis would have decomposed into their constituent parts. This is precisely what has happened in relation to the indefinite proposition and the enthymeme ; and accordingly, by a truer scientific analysis, they are finally rejected from logic.]

know all that is possible and all that is impossible, all that is contingent and all that is necessary. To say nothing of its logical inconsistency,—this being impossible is, as a scientific demand, absurd.

Logicians have not, however, of course left propositions generally in this unquantified state, or their science would have remained hopelessly crippled. They proceeded, as we have already said, to consider the quantity of propositions; but here their inconsistency still attends them, and they are destined to be again unsuccessful. For in their analysis, as we have seen, they have only considered the subject, and determined its quantity, while that of the predicate, which it was equally necessary to determine, as being of equal scientific value, is altogether neglected. The proximate influence of this omission in introducing complexity and inconsistency into the science will be seen in the common doctrine of conversion; while some of its remoter consequences will be hereafter signalised. It may be well to premise here that we speak of categorical propositions throughout. We go on, then, to notice *the conversion of propositions on the common doctrine.* When the subject and predicate of a proposition change places, the proposition is said *to be converted.*

This conversion is threefold.

1. *Simple conversion.*—This takes place when the terms are simply transposed, without any change of quantity or quality in the proposition. This is com-

petent in universal negative and particular affirmative propositions; *e.g.*,—

No man is a stone. Therefore,
No stone is a man.
Some man is a tinker. Therefore,
Some tinker is a man.

2. *Conversion per accidens.*—This takes place when the quality of the two propositions remains the same; but the quantity is altered, the predicate in the one being limited on becoming the subject of the other. This holds true in universal propositions, both affirmative and negative;* *e.g.*,—

All violets are flowers. Therefore,
Some flowers are violets.

* [This is the statement of Peter Hispanus, and it has been repeated by Derodon and some others among the later logicians. The application of this species of conversion to universal negatives is, however, altogether useless, as they are converted simply, and thus retain their universality after conversion. It is, moreover, incompetent, inasmuch as, in such a process, an inference of subordination is involved.

By the majority of logical writers it is therefore applied exclusively and formally to universal affirmative propositions. As so applied, however, the name which it bears is unsuitable, since it no longer truly designates the nature of the process which it is employed to express. Taken in this exclusive application, *restrictive* or *attenuate* conversion (the name given to it by Granger) would be much better.

It is worth while noticing, that the logicians in general do not seem to be at all aware by whom this term, *per accidens*, as applied to conversion, was introduced, or what was the kind of process which it was originally employed to denote. None refer to its authorship, while few attempt any explanation of its meaning; and the few who do are for the most part incorrect. Isenach, whose "*Epitome Dia-*

3. *Conversion by contraposition.**—This takes place when the quality of the propositions remains unaffected; but the terms are changed into what is called by logicians infinite, but more appropriately

lecticæ" was published about the year 1510, says, in explanation, that this species of conversion was called *per accidens*, because one of the accidents of the proposition (quantity, to wit) was changed. Keckermann gives a somewhat different and longer account of it. He says, that this kind of conversion is called *per accidens*, because the converted is not *immediately* inferred from the converse, but only *mediately* through the intervention of another proposition; *e.g.*, from the proposition "all man is animal," it is not *immediately* inferred that "some animal is man," but rather that "some man is animal;" and as this can be converted simply, it follows that "some animal is man." (*Systema Logicæ.* Francof, 1628, p. 348.) While a recent Oxford writer gives the following not very intelligible explanation:—"Per accidens—putting in the place of the subject the quality, whether proprium or accident, which the predicate implies. By the old logicians the proprium is constantly called accidens proprium." (*Moberly's Lectures on Logic.* Oxford, 1848, p. 85.) It is difficult to see how this statement (even supposing it to be just as far as it goes) can be accepted as a full account of the matter,—inasmuch as it can at best only apply to those cases in which the predicate is the property or accident of the subject, and by no means to the generic latitude of possible predication to which the conversion extends. Ploucquet is the only one among modern logicians, so far as my knowledge extends, who seems to have understood the sense in which it was originally employed, and who has accordingly given the true explanation of the term. He says, explaining the significance of the letter P (per accidens) in the mnemonic verses, "Notat universalem in particularem, et particularem in universalem esse convertendam, id quod fit *per accidens*, ex natura *materiæ*." (*Fundamenta Phil. Spec.* Tubingæ, 1758, p. 45.) This is the true explanation of the term, and of the process which it originally designated, as employed

* Some logical writers, it appears, have rejected this species as of no logical value.—*Crackanthorpe*, Book iii. chap. 10.

indefinite, by the addition of negative particles ; that is to say, when in the converted proposition, instead of the subject and predicate simply, the contradictory of each is found ; *e.g.*,—

Every man is mortal. Therefore,
Everything which is not mortal is not man.

by Boëthius,* who was the author of this species of conversion, name, and thing. This term was employed by him to denote the conversion of the universal into the particular, and the particular into the universal, from the *accident of the matter* of the proposition. He says, " Harum (propositionum) igitur, particularis affirmatio, particulariter quidem sibi ipsa convertitur, universali autem affirmationi *per accidens*, et rursus universalis negatio, loco principe sui recepit conversionem, ad particularem vero negationem *per accidens* converti potest. Nec vero negationis particularis ad seipsam principaliter stabilis ac firma conversio est, sed negationi universali secundo loco atque accidentaliter." *Introductio ad Syllogismos.* (*Opera, Basil.* 1546, p. 575.)

But the *formal* conversion, (to be carefully distinguished from the *material* conversion of Boëthius,) which the term was subsequently and exclusively employed to denote, had been discriminated long before the time of Boëthius. It was expressly taken by Aristotle, and called by him *partial* or *particular* conversion, (*ἀντιστροφὴ ἐν μέρει.*) *Anal. Pr.* i. c. 2, § 1.). It was subsequently also signalized by Apuleius under the name of *reflex* conversion. His words are, " Universalis autem dedicativa et ipsa quidem non est conversibilis, sed particulariter tamen potest converti : ut cum sit *omnis homo animal*, non potest ita converti, ut sit *omne animal homo ;* sed particulariter potest, *quoddam animal homo.* Verum hoc in simplici conversione, quæ in conclusionum illationibus *reflexio* nominatur." (*Opera Omnia*, Lugd., 1600, p. 419.)

It may seem useless to have dwelt so long on this kind of conversion in the very act of abolishing it ; but that it is dead is no reason whatever why so venerable a member of the ancient system should not receive decent burial.]

* For the reference to Boëthius I am indebted to Sir W. Hamilton.

This holds true in universal affirmative and particular negative propositions. The rules* governing conversion are given by different logicians with numerical differences; in substance, however, they are much the same. But as the enumeration would be tedious, and the nature of the process in its different species is evident from the statement of each, we shall not repeat them here.

We might remark on this process generally, that it is, for the most part, logically incompetent; since in the second species we interpolate a quantity not formally given, and in the third create an entirely new proposition by new terms.

But we pass on to remark, specially, *that the whole doctrine of conversion, as commonly understood, is on the principle of the new analytic false and useless.*

This inconsistent and cumbrous doctrine resulted, as we have said, from a false analysis by logicians of the elements with which they had to deal. The whole doctrine is founded upon the relation of quantity between the subject and predicate in a proposition; but if a principal element of that relation be left out, the doctrine will of course be defective. Logicians stand chargeable with this neglect. They commenced to recompose their system before, by thorough decomposition, they had obtained all the elements requisite

* *Crackanthorpe* gives five, *Wallis* six, another British writer twelve.—*The Port-Royal* three, reduced to two.

for that purpose; and to remedy the deficiencies thus occasioned, they have had recourse to the complicated process briefly stated above;—thus, with labour and difficulty—and even then imperfectly—by a complex process, and a number of particular rules, effecting that which a simple proximate principle of their science would, if recognised, have spontaneously and perfectly accomplished. As this confusion and complexity has arisen from a faulty analysis, so a perfect analysis at once introduces order and simplicity. A full decomposition of the elements contained in thought discovers that the predicate is always of a given quantity in relation to the subject; that this is known and recognised as the condition of predication. It thus reveals that the relation between the terms of a proposition is one not only of similarity, but of *identity;* that the subject and predicate of a proposition, when the relation of each to the other is recognised, and both are quantified, are always necessarily simply convertible; that the terms of a proposition, in short, are of an absolute equality, and all predication an equation of subject and predicate. Quantify the predicate, and two notions of different extension are at once brought into equality; the sphere of an individual object in a notion is marked out, and that sphere becomes absolutely convertible with the object; *e.g.*,—

All man is some animal.
Some animal is all man.

Some men are all philosophers.
All philosophers are some men.

Boëthius is some Roman.
Some Roman is Boëthius.

Thus, on the principle of the new analytic the whole doctrine of ordinary conversion, with its complex species and its manifold rules, passes away, and the whole process becomes as practically simple as it is scientifically complete. The terms of a proposition are exhibited in their true relation, and that relation reduces all the species of conversion to one—*that of simple conversion.* Thus, in the words of an acute writer, whose apt statement in relation to this doctrine is true in a far wider application than he designed it—to the whole and not to a part alone of the doctrine of conversion. "Omnes conversionum leges pendent à cohæsione, vel potius ab identitate subjecti et attributi: quod si enim subjectum conjungitur et *identificatur* ut aiunt, cum attributo, necesse est pariter attributum *uniri* et *identificari* cum subjecto." *

We proceed to consider—

III. *The influence of this principle on the doctrine of categorical syllogisms, in contributing to effect,* 1°, *the reduction of their general laws to one;* 2°, *the*

* "*Philosophia Burgundica,*" 1678, tom. i. Institutiones Logicæ. Sect. Secunda, cap. 2. (By Du Hamel.)

abolition of their special laws: and from this new simplicity the amplification of the valid forms of reasoning.

We premise a word or two on the nature of a syllogism in general, and of a categorical syllogism in particular.

" A syllogism is the product of that act of mediate comparison, by which we recognise that two notions stand to each other in the relation of whole and part, through the recognition that these notions severally stand in the same relation to a third."

A syllogism or reasoning is thus like a concept and a judgment the product of the comparative faculty—the comparison of part and whole. This indeed is the characteristic of all reasoning—alike of the simple syllogism and of the most lengthy and profound argument. All reasoning is but the comparison and determination of wholes and parts. As in concepts various attributes, in judgments various thoughts, are compared in order to determine the relation of part and whole subsisting between them; so in reasoning two notions are compared together with a third in order to determine their connexion with each other—the only difference being the higher complexity which in this case the act of comparison assumes. A reasoning thus *differs* from a judgment in the superior complexity of the act, in being an immediate act of comparison in which two notions, whose relation

to each other is unknown, are compared together through a third, whose connexion with both is recognised. But it *agrees* with a judgment in being an undivided act of mind ; for as the connexion of part and whole between two notions, enounced by a reasoning, is determined by the recognition of their mutual relation to a third ; and as relatives are only recognised together, it follows that it is an undivided act of consciousness.* A syllogism indeed forms as truly a mental whole as a concept, though each is capable of being subsequently analysed for scientific purposes into its constituent elements. On being subjected to such analysis, every true syllogism or reasoning is found to contain three, and no more than three, propositions, each of which has three, and only three, terms. There will be three propositions, since the two notions, touching whose relation the mind is in doubt, are both compared with another whose relation to each is manifest. This affords two propositions, in one of which the third notion is a contained part in relation to one of the doubtful notions ; and in the other a containing whole in relation to the other doubtful notion. And there is of necessity the conclusion in which the doubt is dispelled, and the relation of the two notions themselves determined. This process is in every valid syllogism determined by a law of thought, and the connexion is thus one

* Hic modus (per syllogismum) ratiocinandi est ex simplissimis, et intuitivè uno actu mentis perspicitur.—*Ploucquet.*

of absolute necessity. There will, it is obvious, be as many valid kinds of syllogism as there are different laws of thought on which they may be respectively founded.

A categorical syllogism is one in whose major premise the relation of the terms is simple; whose procedure is determined and whose conclusion is necessitated by the laws of identity and contradiction.

Having premised thus much about syllogisms in general, and categorical syllogisms in particular, we shall proceed—

i. *To state with brevity the common doctrine of syllogistic figure, mood, and reduction; and then generally some of the defects by which it is characterised.*

And,

ii. *To state the one supreme canon of the new analytic, which potentially contains the whole doctrine of categorical syllogisms, and then proceed to develop from it some parts of that doctrine.*

We proceed then—

i. *To state the common doctrine of syllogistic figure, mood, and reduction.*

Figure.—What is commonly termed by logicians syllogistic figure arises from the relation of the middle term as subject or predicate to the extremes. The four possible varieties of position which the middle

term may occupy in the premises thus determine four syllogistic figures.

In the *first figure* the middle term is the subject of the major premise, and the predicate of the minor; *e.g.*,—

All rational is risible.
All man is rational.
Therefore—All man is risible.

The laws of this figure are—

1. That the subsumption* be affirmative.

* [These words sumption and subsumption are new, and may therefore require a few words of explanation if not of defence. They are introduced and employed by Sir William Hamilton to express the two first propositions of a syllogism, instead of the common designations major and minor premise.

We much need apt terms by which to express these members of the syllogism, and for the creation of new or introduction of foreign words in such a relation, may certainly urge the first part of the plea of Lucretius, "propter egestatem linguæ," if we cannot go on to add with him, "et rerum novitatem." The members to be named are old enough, but they still have never received precise and discriminative epithets, at least in our logical terminology. The terms major and minor premise are objectionable, if for no other reason, from the confusion of terms with propositions likely enough to arise from the omission of the second member of the term, and the consequent indiscriminate use in hasty reference of the epithets major and minor alone. Single, precise, and discriminative words would on every account be far better than these combinations. The term *propositio* was the designation of the major premise of a syllogism, from the days of Cicero downwards, with few exceptions. Among these exceptions are Quintilian who uses *intentio*, Boëthius who sometimes uses *sumptum*, and Rodolphus Agricola who employs *expositio*. *Assumptio* was even more generally the designation of the second proposition of the syllogism—the minor premise. So that, in fact, when the two first members of a syllogism are not (after Aristotle) called the major

2. That the sumption be universal.

In the *second figure*, the middle term is the predicate in each premise; *e.g.*,—

No liar is to be believed.
Every good man is to be believed.
Therefore—No good man is a liar.

and minor proposition, the terms *proposition* and *assumption* are generally found employed to express them. These terms all more or less shadow forth the relation of subordination which exists between these parts of the syllogism. This relation is, however, far more aptly and explicitly denoted by the correlative terms *sumption* and *subsumption;* and as we have already assume and assumption with other cognate terms, there is no reason why we should not also avail ourselves of the convenient terms subsumption and subsume.

Even the terms sumption and subsumption are not, however, equal to the whole extent of the necessity, for between the two first members of syllogisms, in the second and third figures, there is no such relation of subordination as they express, so that it is only by courtesy to custom that these terms can be applied to them. The same is true of the reasoning from wholes to wholes; so that we still need terms of generic latitude sufficient to express the two first members of *any* syllogism. For all ordinary purposes, however, the above are sufficient. They have the great merit of being single and precise epithets; and after what has been said, their use in the figures cannot be misunderstood.

The only thorough-going and consistent attempt ever made, that I am aware of, to render the technicalities of logical science into English terms, was that of Ralph Lever, Dean of Durham. In his logical treatise, entitled, "The Art of Reason, rightly termed *Witcraft*, teaching a perfect way to argue and dispute," and published in London in the year 1573, he expressly undertakes to accomplish this. He explains and defends his procedure in the preface, (*forespeach,*) of which the following extract may be taken as a specimen:—"For trial hereof I wish you to aske any English man, who understandeth neither Greek nor Latin, what he conceiveth in his mind when he heareth this word, a *backset*, and what he doth conceive when he heareth this term, a *predicate*. And doubtlesse he must confesse, if

The laws of this figure are—

1. That one of the two premises be negative ; and consequently that the conclusion be so.

2. That the sumption be universal.

In the *third figure*, the middle term is the subject in both premises ; *e.g.*,—

All man is risible.
All man is capable of science.
Therefore—Some capable of science is risible.

The laws of this figure are—

1. That the subsumption be affirmative.

2. That the conclusion be particular.

In the *fourth figure*, the middle term is the predicate in the sumption and the subject in the subsumption ; *e.g.*,—

All oranges are fruit.
All fruit is refreshing
Therefore—Some refreshing things are oranges.

he consider the matter aright, or have any sharpnesse of wit at al, that by a *backset* he conceiveth a thing that must be set after, and by a *predicate* that he doth understand nothing at all." He accordingly renders every (or certainly almost every) technical term of common use in logic by combinations of purely Saxon words. We will give both as a specimen of his coinage, and as pertinent to the purpose of the present note, the terms which he has used to express the different members of the syllogism. These are *foresay* and *endsay, first foresay*, (major premise,) *second foresay*, (minor premise,) *endsay*, (conclusion ;) or, in his own words,—" The two first shewsayes (propositions) that are placed in a reason by rule, are called foresayes—the third may be termed an endsay." (*Art of Witcraft*, p. 103.) These terms are sufficiently general for *any* form of syllogism ; but as the technical terms of the science are all of Latin derivation, Saxon compounds cannot be accepted.]

The laws of this figure are—

1. When the sumption is affirmative, the subsumption is always universal.

2. When the subsumption is affirmative, the conclusion is particular.

3. If either of the premises be negative, the sumption must be universal.*

Mood.—What is called mood is a modification of a syllogism, determined by the quantity and quality of the propositions of which it is composed. All the figures admit of syllogistic variations thus determined. Four kinds of propositions are, according to logicians, afforded by the various possible combinations of quantity and quality. Universal affirmative, (A)—universal negative, (E)—particular affirmative, (I)—particular negative, (O.) And as there are three propositions in every syllogism, all the possible combinations of quality and quantity will be sixty-four. Of these sixteen are excluded from having negative premises; twelve from having particular premises; twelve more for having a negative premise with an affirmative conclusion; eight, from one of the premises being particular, but the conclusion universal; and, finally, four more from having a negative conclusion where both premises were affirmative. There are thus left twelve moods. Of these, however, for various particular reasons, six

* These laws are taken from the *Port-Royal Logic*, but they are substantially the same in most logical systems.

only are allowable in each figure, making twenty-four in all. Of these, however, five are again thrown out of account from having a particular conclusion where a universal is competent. There thus remain in all the figures only nineteen valid moods. These are embodied in the well-known lines—"*Barbara Celarent,*" &c.

Reduction.—Logicians, though altogether ignorant of the true character of figure, strictly so called, seem always, however, to have felt, that the form of reasoning in the first figure was more exact than in the three others, and the conclusion afforded by it more logically direct and satisfactory. They have, accordingly, devised a process for changing syllogisms of the three other figures into those of the first. *This process is technically termed reduction.* Reduction is twofold—

1. *Reductio ostensiva.*—This is effected by the conversion and transposition of propositions; *e.g.*—*Disamis* of the third figure into *Darii* of the first.

Disamis.

Some tyrant is unjust.
All tyrants are cruel.
Some cruel is unjust.

Here the major premise and conclusion are first converted, and then the premises transposed; thus—

Darii.

All tyrants are cruel.
Some unjust are tyrants.
Some unjust are cruel.

2. *Reductio ad impossibile.*—This is effected, not directly, but indirectly, by proving that the contradictory of the syllogism under examination is something impossible or absurd. This is accomplished by taking the contradictory of the conclusion with one of the premises, and inferring from these the contradictory of the other premise—in the second figure the contradictory of the minor—in the third the contradictory of the major premise. Thus—*Baroco* of the second into *Barbara* of the first figure:

Baroco.

All rational is risible.
Some animals are not risible.
Some animals are not rational.

Barbara.

All rational is risible.
All animal is rational.
All animal is risible.

Such, on the common doctrine, is a short account of syllogistic figure, mood, and reduction. We go on *to state generally some of the defects by which this doctrine is characterised.*

1. *The whole doctrine is cumbrous and unsatisfactory.*

In addition to the general laws which are laid down by logicians as governing all syllogisms, and the various kinds of syllogism which have been signalised, we have here what are represented as four new essential variations of the syllogistic form, each

guarded by its own complement of special laws—forming altogether a code of particular rules for the detection of petty offences, which is certainly sufficiently intricate and perplexing. Now, the necessity of these empirical laws is not attempted to be vindicated on any thorough-going logical principle; and until it be, we think their minute and multiform character is valid ground of objection. No right, moreover, has been established, that we know of, for the three last figures themselves, to occupy the place they do as true variations of the syllogistic form, except a prescriptive right, which in logic, where so many false principles have for so long usurped authority, and so many true ones been ignored, when unaccompanied by any other, is rather ground for suspicion than otherwise. Accordingly, till a better right than this be shown why they should be considered independent syllogistic forms, their want of conformity to recognised law in their procedure, and the indirectness of their conclusions, furnish good ground of dissatisfaction with their logical position.

Next we have *the moods* in each figure—the testing of the true moods in each by its particular laws—these laws determining the exclusion in one figure of moods that are held valid in another; and this exclusion thus necessarily producing a numerical difference of moods in different figures. That what is a true mood in one figure should be a false one in another, is, to say the least, unsatisfactory.

And, finally, we have the doctrine of REDUCTION—the most cumbrous and unsatisfactory part of the whole. The first half of the process involves a procedure opposed to other parts of the common doctrine, since it admits the transposition of premises at will. (Of this, however, more presently.) The procedure of the second half of the process is almost ingeniously perplexed and cumbrous, and when accomplished, so far as we see, answers no end whatever. We form an entirely new syllogism, which throws no light upon the old; illustrates no part that was before obscure; gives us, indeed, no knowledge at all. The old figure remains with its irregularity (if it had any) uncorrected; with its illegal aspect (if that were its vice) unremoved. It is, in short, cumbrous without the justification of being useful; and most unsatisfactory it should seem in the mere wantonness of being so, since it cannot urge the extenuating plea of necessity.

2. *This doctrine is inconsistent.*

We begin by noticing the inconsistency displayed in the discrimination of moods on the common doctrine. We have seen that the principle on which the discrimination of moods proceeds, is the difference in quantity and quality of the propositions which constitute a syllogism. In order to determine a variation of mood in a syllogism, one at least of its propositions must differ, in one or other of these respects, from all other co-ordinate moods. If in

two syllogisms of a given figure there be no difference, either of quantity or quality in the propositions of which they are composed, these syllogisms are logically reckoned as one and the same: there is in this case no modal variation. This at least is the common doctrine, if that doctrine have any meaning. In opposition thereto, however, we have discriminated as true varieties *in the second figure*—

Camestres.

All wise men are truly happy.
No intemperate man is truly happy.
No intemperate man is a wise man.

Cesare.

No intemperate man is truly happy.
All wise men are truly happy.
No wise man is an intemperate man.

And in the third figure—

Datisi.

Every true patriot is brave.
Some true patriots are persecuted.
Some that are persecuted are brave.

Disamis.

Some true patriots are persecuted.
Every true patriot is brave.
Some who are brave are persecuted.

Now, the syllogisms thus given under each figure have no difference whatever in the quantity or qua-

lity of their propositions ; they are, therefore, according to the theory of logicians, *the same.* Practically, however, they have been considered from time immemorial as distinct ; as constituting valid variations of syllogistic form under each figure. If this be so, the principle on which the discrimination of mood avowedly proceeds is, at least, implicitly given up, and another is introduced—*that of the transposition of propositions ;* for it is on this principle alone that the syllogisms given above can be vindicated as distinct. If, however, the transposed order of propositions be recognised as affording a worthy principle for the discrimination of syllogistic difference, then a number of new forms will emerge, of which logicians have taken no account. The catalogue of syllogistic variations will immediately be swelled far beyond its present limits, since every existing variety is capable, by the transposition of its propositions, of receiving a fivefold amplification. It is clear, however, that the transposed order of propositions affords no principle of any scientific value in the discrimination of syllogisms ; and, what is more to the present purpose, it is equally clear, that whatever be its value, it is one which has not been recognised by logicians, since they have not even incidentally adverted to it in the exposition of their doctrine. The principle of modal variation on that doctrine is manifestly the difference of propositions in quantity and quality. In obvious inconsistency, however, with this

recognised law, there remain the syllogisms stated above.

But a more important, if not more glaring inconsistency remains to be noticed *in the correlative doctrines of figures and reduction.** The opposition here is so great that it seems to us truly marvellous that they should ever have existed together. They appear mutually and triumphantly to destroy each other. We will endeavour to explain what we mean in a few words. *The inconsistency may be stated thus:* In the cogency of formal proof there can be no degrees. Logic, it need hardly be repeated, is a formal science, proceeding from, and determined through its whole course by, *the laws of thought.* This being the case, every true variation of the syllogistic form will afford a conclusion equally valid and direct; since a form of reasoning is true only as determined by a law of thought, and the laws of thought are equally universal and imperative. If a given syllogistic form be determined as original and essential, it is already self-sufficient; it needs no help, it can receive none. No process can be devised for bestowing on its conclusion a higher validity than that which it possesses of its own inherent right. For, as we have said of formal proof, there can be no degrees of cogency. In every case it is alike valid and direct. With

* Throughout the ensuing discussion we use "*figure*" simply in the sense of *figure strictly so called, i.e.*, to the exclusion of the first, in order to avoid constant circumlocution.

respect, therefore, to every true variation of syllogistic form, *what is called reduction is useless.*

On the other hand, if the conclusion afforded by a syllogism be one-sided and indirect, and its form, therefore, apparently imperfect or irregular, there is good ground for suspicion that there is some complexity or confusion in its form, which it is necessary to disentangle or clear away before the syllogism emerges in its purity, and before, therefore, its true form can be correctly determined. When this confusion or complexity is removed—and it is the office of logical analysis to accomplish this—the syllogism will appear in its real character, and naturally fall under some determinate class of recognised syllogistic form. To such a syllogism what is called *reduction* is obviously inapplicable, since we cannot talk of reducing a syllogism of a given form to itself. Thus, on either alternative, the doctrine of *reduction* seems alike inapplicable, if not impossible. *If the syllogistic form be essential, reduction is useless; if it be accidental, it is absurd.*

Logicians, however, so far as we can understand the common doctrine, seem to have chosen the former, and perhaps milder alternative,—that the figures are true variations of syllogistic form. If this were not the case, it would have been explicitly stated; and, in fact, the doctrine of reduction itself is at once the evidence that they so regarded them, and the proof that this is not their true character. If they did not so consider them,

it is difficult to account for the existence of reduction at all; for it is introduced expressly to strengthen the position of the figures, and to vindicate to their conclusions the highest validity. Not clearly comprehending the true nature of the figures, their doctrine respecting them was imperfect. They determined that they were true syllogistic varieties, but still felt that this was not perfectly satisfactory—that there was something wanting in their doctrine; and in order to bestow upon it the requisite completeness, they unhappily fell upon the doctrine of reduction—a process which, so far from establishing the truth of that which it was introduced to demonstrate, is the clearest evidence of its falsehood. In fact, we cannot but regard the whole doctrine as the work of a most perverse and suicidal ingenuity. Introduced as a bulwark of strength to the figures, it becomes the very mockery of their weakness, and affords its sustaining aid only in the moment of their dissolution. For we certainly cannot understand how a doubtful variation of syllogistic form is vindicated as valid and essential through a process which accomplishes its destruction; in other words, by being changed into a form, of the validity of which there is no question.

But even granting that the whole doctrine was, in the main, correct, it is chargeable with inconsistencies of detail; such as the explicit recognition at one time of a determinate major and minor premiss in the figures, and the implicit denial of this at an-

other. These, however, it is not necessary now to notice. Suffice it to have shown that the related doctrines of figure and reduction are most seriously inconsistent, if not mutually destructive of each other.

3. *The common doctrine is destructive of the science itself.*

We bring this charge against the common doctrine —and it is the gravest of all—that it is destructive of the science, by implicitly, at least, impeaching the veracity of the laws of thought upon which the science is founded.

This may be illustrated in one or two ways. In all categorical syllogisms the reasoning is founded upon the law of identity, that a whole is identical with all its parts, a concept with its attributes, &c., and thus that " a part of a part is a part of the whole." The reasoning, therefore, if it be valid, always of necessity involves the subordination of one part to a whole through a larger part.*

* [This statement requires some modification ; for, on the law of identity, the reasoning from wholes to wholes is as competent as that from parts to wholes. By this law we are entitled to infer the relation of identity between two wholes, from the perception that they stand in this relation to a common third whole, just as certainly as we are to infer the relation of inclusion between a given whole and part, from the perception that these stand in the same relation to a common third part ; *e.g.*, the reasoning all B is all A, all C is all B, therefore all C is all A, is just as competent as the reasoning all B is A, all C is B, therefore all C is A. Taken absolutely, therefore, the objection stated in the text will not stand the test of criticism. Considered relatively to the common doctrine, it is, however, valid. On that doctrine all direct formal reasoning from wholes to wholes

Now, the common doctrine recognises the figures strictly so called as ultimate varieties of syllogistic form; implicitly, at least, declares that they are simple forms, and their reasoning valid as it stands. But in these figures there is no subordination of lesser parts to wholes through larger parts.

It is therefore clear that if the law, according to which all true reasoning is affirmed to proceed, enjoins this subordination, but that there are found, and recognised as valid, forms in which there is no such subordination—that the law is no longer trustworthy; for having proved mendacious once, its character of necessity and universality has departed, and it may deceive again. Thus, implicitly at least, the main foundation of all reasoning is cut away.

Again, we have seen in the common doctrine the numerical inequality of the moods under different figures. In each figure some mood is determined as valid which is ignored by the rest. Thus throughout the whole scheme moods are retained as true at one time which are rejected as false at another.

Now, what is the test by which the validity and

is impossible. For a direct reasoning from wholes to wholes is only possible through the express quantification of the predicate, which the forms and rules of the common doctrine alike forbid. In every reasoning which obeys these rules, the extent of some one term in the syllogism is necessarily left indeterminate, so that its identity of extent with any other term cannot be formally inferred. On the common doctrine, the reasoning is thus necessarily from parts to wholes. Taken with this explanation, therefore, the statement in the text may stand.]

invalidity of any and every variety of syllogism is determined? No other *than its obedience to, or violation of, the laws of thought.* If a syllogism agrees with these laws, it is true; if not, it is false. This criterion imperatively determines every possible variation of syllogistic form. If a syllogism be true to the laws of thought in its formal essence, no accidental irregularity or transposition in the arrangement of its parts can render it invalid; if it be not thus true in the inward essence of form, no outward regularity of expression can supply the wanting validity. In other words, what the laws of thought allow, no schematic difference can ever ignore; what the laws of thought condemn, no schematic variation can ever successfully vindicate.

In direct opposition to all this stands the common doctrine. Judged by the above standard, its whole procedure is most illegal. In its admissions and exclusions of syllogistic variety it is equally capricious and empirical; and throughout it is consistently regardless of the great laws by which the whole process, as a logical procedure, must be ever determined. We find a certain mood rejected under a given figure—we presume because it is invalid; but it can be invalid only because it violates the laws of thought. Presently after we find this same mood reappearing in another figure, and recognised as scientifically true. What the laws of thought erewhile condemned, the schematic difference now tri-

umphantly interposes to allow. What we had supposed to be rejected from the science as logically false, now boldly returns under express scientific sanction.

Thus, on the common doctrine, *the accidents of arrangement* triumph over the *essentials of form:* the *contingencies of expression* are of higher authority than the *necessities of thought.* In a formal science we have its accidental arrangement actually dethroning its essential principles; contingent and particular irregularities boldly usurping that authority, through the legitimate exercise of which they would have been themselves exiled,—that authority through the recognition of which alone the science can be preserved—the authority of *law necessary and universal.*

If the procedure which issues in these results be competent, then it is evident that logic exists no longer; for the destruction of the science is obviously involved in the destruction of the laws on which it is exclusively founded. And this destruction of the laws of thought is, as we have shown, in effect accomplished by the common doctrine, in the practical contradictions of these which its procedure involves. It thus implicitly contains in it principles which, if fully developed, would overthrow logical science.

We have thus seen amongst the more general defects which belong to the common doctrine, that it is practically cumbrous and unsatisfactory; that it

is theoretically inconsistent; and that it involves principles destructive to the science itself. The special falsity and uselessness of this doctrine will appear more fully in detail under the division to which we now proceed.

ii. *To state the one supreme canon of the new analytic, which potentially contains the whole doctrine of categorical syllogisms, and then to develop from it some parts of that doctrine.*

That canon is—" What worse relation of subject and predicate subsists between either of two terms and a common third term, with which both are related, and one at least positively so—that relation subsists between these two terms themselves."

This canon, as we have said, involves the whole doctrine of categorical syllogisms; determines every kind of such syllogisms; and is to them an all-sufficient and exhaustive code of law, observing which none can be formally invalid.

We have now to show, in conformity with the purpose of this essay in general, and its third division in particular, the influence which the principle of a quantified predicate has in accomplishing the reduction of syllogistic rules to this single canon.

And here it is obvious at once, that before any such reduction of the general laws of these syllogisms can take place, the special laws which govern particular classes of such syllogisms must be dealt

with. In fact, the condition of the possibility of any such reduction of the general laws is the annihilation of the special laws. Whatever, therefore, tends to effect the abolition of these special laws, (laws of the several figures, to wit,) tends directly to facilitate that simplification of syllogistic law which emerges in the single canon. The principle of a quantified predicate directly contributes to accomplish this, by proving the falsity and uselessness of these special rules.

For example, the laws of the *first figure* are—*that the sumption be universal, and—that the subsumption be affirmative.* Quantify the predicate, however, and neither of these laws hold.

First rule falsified.

Some men are some fleet-footed.
All rational is all man.
Some rational is some fleet-footed.

Second rule falsified.

All idealists are some philosophers.
No sensualist is any idealist.
No sensualist is some philosopher.

The laws of *the second figure* are—*that one of the premises be negative, and—that the sumption be universal.* To these the principle of a quantified predicate immediately applies, and falsifies them—

First rule falsified.

All risible is all man.
All philosophers are some men.
All philosophers are some risible.

Second rule falsified.

Some mortal is all man.
All rational is all man.
All rational is some mortal.

These examples may serve to illustrate specially the influence which the principle of a quantified predicate has upon these laws. It is to be remarked, however, generally, that these laws exist only in consequence of a defective logical analysis, and apply only to such an imperfection. When the analysis, therefore, is complete, these laws naturally fall away as henceforth useless and inapplicable. The recognition of a quantified predicate and of the true nature of figure renders this analysis complete. Thus the principle of a quantified predicate co-operating with the true doctrine of figure, sweeps away for ever from logic, as an encumbrance, all these special laws. The special laws being swept aside, the way is prepared for the reduction of the general. And this reduction effected, there emerges the supreme canon as given above. This canon, it is obvious, may be again easily evolved into those general laws of which it is the compend. We may take as an example the two most general laws of categorical syllogisms.

1. *That both premises be not negative.* This is expressed in the canon by the clause—" With which both are related, *and one at least positively so.*"

2. *That the middle term be distributed in one at least of the premises; and it is of no consequence*

whether it be distributed as the subject or the predicate.

The first part of this law is expressed in the canon by the clause—"*related to a common middle term.*" If it be common to both it must be distributed. The latter part of the law is expressed in the clause—"What worse relation of subject and predicate subsists between *either of two terms and a common third term.*" The common third term may thus be related to the two other terms either as subject or predicate.

It would be by no means difficult to evolve in the same manner the canon into the six more general syllogistic laws commonly given by logicians. The relation of these laws to the different clauses of the supreme canon is, however, manifest, and therefore need not be formally evolved here.

We pass on, then, to consider this canon in another aspect. We said that it determined every kind of categorical syllogism.

We shall endeavour to illustrate this;—

1. *Syllogisms differ with respect to the wholes in which they proceed.*

We have already said that all reasoning (deductive, that is, to which, when not otherwise specified, we always refer when speaking of reasoning in general) is from whole to part; but as there are two kinds of logical wholes and parts, there will naturally be two kinds of reasoning, corresponding severally to these different quantities. These wholes are—the *meta-*

physical or comprehensive whole; and the *logical or extensive* whole. A syllogism proceeding in the former is a comprehensive syllogism, in the conclusion of which the subject is the greatest whole, and the predicate the smallest part. A syllogism proceeding in the latter whole is an extensive syllogism, in the conclusion of which the subject is the smallest part, and the predicate the greatest whole. These different kinds of syllogism, distinguished by the different kinds of wholes in which they proceed, are determined by the first clause of the canon—"*What worse relation of subject and predicate subsists between two terms,*" &c. In the whole of comprehension the predicate is worse than the subject, since it is a part in relation to a whole; in the counter whole of extension, the subject is worse than the predicate, since in this quantity the predicate has become the greatest whole, and the subject the smallest part.

2. *Syllogisms differ with respect to figure.*

The variation of figure arises, as we have seen, from the various positions of the middle term in relation to the extremes. This variation is evidently determined in the canon by the clause—"*What relation subsists between either of two terms and a common third term.*"

But here it is necessary to go somewhat more fully into detail. We shall therefore return to the canon presently.

In considering figure somewhat more closely, we shall notice;—

a. The true nature of the figures.

We have seen that the figures, strictly so called, are regarded by logicians as true and original variations of the syllogistic form. We have seen also some of the inconsistencies which such a doctrine involves: enough certainly to beget a suspicion that it could not be the true one. We were thus led to suppose that there must be some confusion or complexity in the figures which it is necessary to remove before the true form of their reasonings could be seen in its ultimate purity and exactness. What this confusion or complexity is, we now proceed explicitly to show, by stating and illustrating the true nature of the figures.*

"The figures (strictly so called) are hybrid or mixed reasonings, in which the steps of the process are only partially expressed; the unexpressed steps are, in general, only conversive inferences which we are entitled to make from those that are expressed."

This being the nature of figure, it follows that, since all the real steps of the process are not expressed in the reasonings, the conclusion does not of necessity follow from the expressed premises; but the mind at once inferring and interpolating the wanting steps of the process, the conclusion follows in virtue of such inference and interpolation. When this mental interpolation is recognised, and the real premise which it constitutes is expressed, the syllogism emerges in

* Touching the value and history of this exposition, see the Appendix.

its simple form, and is at once recognised to be (through all the variations of mood and figure, strictly so called) a syllogism of the first figure. All such varieties are therefore thus shown to be, in their complex state, only unessential variations of that figure. We shall illustrate this in concrete examples through the moods of the second and third figures.

The moods of the second figure are—*Cesare, Camestres, Festino, Baroco.*

A syllogism in Cesare is—

No unreflective man is a philosopher.
All idealists are philosophers.
No idealist is unreflective.

By conversive inference we obtain as the real sumption, "no philosopher is unreflective," and this interposed in the place of the ostensible sumption, produces a syllogism in *Celarent* of the first figure, *e.g.*,—

No philosopher is unreflective.
All idealists are philosophers.
No idealist is unreflective.

A syllogism in Camestres is—

All animals are sentient.
Nothing unorganised is sentient.
Nothing unorganised is animal.

We have already said, when speaking generally of figure, that the premises are in this syllogism transposed; and that but for such transposition it is exactly the same as *Cesare;* reversing the premises then, and

dealing with it in the same manner as the last, it appears in the same form as *Celarent* of the first figure.

Nothing sentient is unorganised.
All animals are sentient.
No animal is unorganised.

A syllogism in Festino is—

No truly wise men go to extremes.
Some truly religious men go to extremes.
Some truly religious men are not truly wise men.

Here with the sumption converted the syllogism appears as *Ferio* of the first.

None who go to extremes are truly wise.
Some truly religious men go to extremes.
Some truly religious men are not truly wise.

A syllogism in Baroco is—*

All lilies are fragrant.
Some flowers are not fragrant.
Some flowers are not lilies.

Here the subsumption is to be dealt with; and by conversive influence we obtain "*some things not fragrant are flowers.*" Interpolating this, we have a syllogism in *Darii* of the first.

* [The reduction of this mood was one of the standard difficulties of the logicians. It could only at best be done with difficulty, and through the clumsy process designated *ad impossibile;* nor does it accommodate itself well to this expository process of Kant's; since after all it appears as a syllogism of the *fourth* figure rather than of the *first.*]

All lilies are fragrant.
Some things not fragrant are flowers.
Some things not lilies are flowers.

The *third* figure.

We have seen, in removing the complexity of syllogisms in the second figure, that it is the sumption for the most part (that is in three out of four moods) which is affected by conversive inference; and that that inference is made chiefly from "the absolute negation of the first notion as predicate of the second, to the absolute negation of the second notion as predicate of the first." In the third figure, on the other hand, it is the subsumption which is chiefly affected by conversive inference, and that inference is generally made "from the total or partial affirmation of a lesser notion of a greater, to the partial affirmation of the greater notion of the lesser."

The moods of the third figure are—*Darapti, Felapton, Disamis, Datisi, Bocardo, Ferison.*

A syllogism in Darapti is—

Every good man is happy.
Every good man fights with himself.
Some who fight with themselves are happy.

By conversive inference we here obtain as subsumption—"*some who fight with themselves are good men;*" and the syllogism is then in *Darii* of the first figure.

Every good man is happy.
Some who fight with themselves are good men.
Some who fight with themselves are happy.

A syllogism in the second mood Felapton is—

No man is winged.
All men are bipeds.
Some bipeds are not winged.

By converting the subsumption it becomes *Ferio* of the first.

No man is winged.
Some bipeds are men.
Some bipeds are not winged.

A syllogism in the third mood Disamis is—

Some patriots are persecuted.
Every patriot is brave.
Some that are brave are persecuted.

Here the premises are first to be transposed, then converting the subsumption the syllogism appears as *Darii* of the first—

Every patriot is brave.
Some that are persecuted are patriots.
Some that are persecuted are brave.

With respect to the fourth mood in the figure, *Datisi*, we have already shown that it differs from the third only in the transposition of its premises. Converting the subsumption, therefore, it appears in the same form as *Darii* of the first. We give the syllogisms together—

All true philosophers are truly noble.
Some true philosophers are despised.
Some that are truly noble are despised.

All true philosophers are truly noble.
Some that are despised are true philosophers.
Some that are despised are truly noble.

A syllogism in the fifth mood Bocardo is—

Some poets are not philosophers.
All poets have genius.
Some who have genius are not philosophers.

The premises are here transposed, and the sumption converted—it then appears as *Darii*—

All poets have genius.
Some not philosophers are poets.
Some not philosophers have genius.

A syllogism in the last mood Ferison is—

No hope is unattended with pleasure.
Some hopes are delusive.
Some delusive things are attended with pleasure.

Converting the sumption it becomes *Ferio* of the first—

No hope is without pleasure.
Some delusive things are hopes.
Some delusive things are attended with pleasure.

The syllogisms of the figures, strictly so called, are thus shown to be complex reasonings, which, when cleared of their complexity, and simply expressed, *i.e.*, expressed in that form which all true reasonings must ultimately assume, in which the least part or whole is subordinated to the greatest part or whole, through a lesser part or whole—appear in their true character as syllogisms of the first figure.

We have here taken no notice of the fourth figure, not because the same process of simplification is not equally applicable to its reasonings, as to those of the second and third figures ; but because, as we shall presently explain, we do not consider it properly a figure at all.

b. The true number of the figures.

We have seen that in the common doctrine four figures are recognised as valid.* The fourth figure

* [The validity of the *fourth* figure as a separate form of reasoning has been often contested, but that of the other three has remained for the most part unassailed. The *third*, however, has not wholly escaped assault. It was rejected by Laurentius Valla on the ground that such a form of reasoning was never used, that there are no examples of it to be found, and as it would seem, as much as for any other reason, because it offended his eye or ear. He does not, indeed, so much reason seriously against its validity, but rather denounces it at once, and that, too, in the most lively and rhetorical manner, as in the last degree preposterous and absurd. The whole style of the rejection is quite in harmony with his wayward originality and independence, as well as with his habit of rash yet fastidious criticism. It is, indeed, but another instance of the fastidious taste of Valla, in whose eyes a sin against purity of style was a moral offence of the gravest kind, who did not scruple to correct the Latinity of Cicero, and of whose criticism it is said the Devil himself stood in such awe, that he was afraid to speak in his presence, being nervous as to the classic purity of his Latin style.

The objections of Valla to the third figure were rebutted by Lazarus Schonerus, (as quoted by Fraunce,) who adduced examples of its use from Cicero and Virgil. Its validity and usefulness were also defended against Valla by Melanchthon, who, referring to it, says, " Laurentius Valla non leviter stomachatur hoc loco, et Aristotelem tanquam capitali judicio accusat, qui hanc figuram tradiderit. Sed Valla dum nullum rixandi finem facit, sæpe etiam incurrit, ut sit ab iracundis, in illos qui nihil peccaverunt. Mihi non tam plumbeo ingenio Aris-

was, however, introduced into the science later; and when introduced obtained a footing less secure than the other three. Some logicians, indeed, have omitted it altogether; while others have expressly redargued its claim to be admitted as a true schematic difference. The reasons of those who opposed its admission have not, however, proved sufficiently strong to eject it finally from the science, since it reappears in the latest systems, and is recognised as logically competent. It is, nevertheless, to be rejected from logic, as being utterly deformed and useless. *Deformed*, since its premises proceed in the whole of comprehension, and its conclusion in the counter whole of extension. *Useless*, since the reasoning in both these wholes is scientifically complete without it. The fourth figure being thus rejected, the three first alone remain. These, therefore, are to be considered as exclusively competent in logic.

c. The true canons of the figures.

We have said that the syllogistic difference of

toteles fuisse videtur, ut nulla de causa tertiam figuram tradiderit. Est enim reperire exempla ejus figuræ, in quibus si mutes dispositionem medii, feceris totum syllogismum obscuriorem." (*Dialectica*. Paris, 1532, fol. 42.)

This extract is taken from Melanchthon's *second* logical work. His opinion in relation to this matter does not appear to have been always equally decided, since Melchior Adam says, (in his short life of him,) referring to it; "Edidit Philippus eodem anno (1520) primum sua Dialectica in quibus *tertiam figuram syllogismorum* neque recipit, neque rejicit; quam deinde iterata editione, an. 1528, admisit." (*Vitæ Germanorum Philosophorum*. Francof, 1706, p. 88).]

figure is determined in the supreme canon of syllogism by the clause, " What worse relation of subject and predicate subsists between either of two terms and a common third term," &c. It is obvious, that this clause determines figure; for the syllogistic difference of figure is discriminated by the position of the middle term in relation to the extremes; or in other words, by the " relation of subject and predicate subsisting between the two terms and a common third term."

But this clause not only determines the difference of figure, it also immediately determines all the possible varieties of such difference. For the relation of subject and predicate, subsisting between two terms and a common third term, must be either that in which the common third term is the subject of one and the predicate of the other, or that in which it is the predicate of both, or that in which it is the subject of both. No other is possible. Now, these three possible variations of relation determine at once the number of the figures and the canons by which they are regulated. For the number of different figures can only answer to the number of different relations; and the evolution of these different relations in detail will be the expression of the laws by which the figures thus discriminated are severally governed.

These relations are—

I. *That in which the common third term is the*

subject of one of the terms, and the predicate of the other.

This constitutes the first figure alike in extension and comprehension.

First in Extension.

B is A
C is B
C is A

Here B, the third term, is the subject of (that is to say, contained *under*) A, the one term; and the predicate of (that is to say, contains *under* it) C, the other term.

So in Comprehension.

C is B
B is A
C is A

Here B, the middle term, is the predicate of (that is to say, comprehended *in*) C, the one term; and the subject of (that is to say, comprehends *in* it) A, the other term.

The canon of this figure is—"In so far as two notions or terms are related, either both positively, or one positively and the other negatively, to a common third term, of which the one is subject and the other predicate,—these two notions are related positively or negatively to each other as subject and predicate."

II. *That in which the common third term is the predicate of both the other terms.*

This constitutes the second figure, and that (contrary to the logicians) is either of affirmative or of negative syllogisms.

Affirmative.	*Negative.*
All A is all B.	All A is all B.
All C is some B.	No C is any B.
All C is some A.	No C is any A.

The canon of this figure is—" In so far as two terms or notions, both subjects, are either both positively, or the one positively and the other negatively, related to a common predicate,—in so far are they either positively or negatively subject and predicate, and that indifferently of each other."

III. *That in which the third term is the subject of both the other terms.*

This constitutes the third figure, and that (also contrary to the logicians) in syllogisms with either universal or particular conclusions.

Universal.	*Particular.*
All B is some A.	All B is all A.
All B is all C.	Some B is some C.
All C is some A.	Some C is some A.

The canon of this figure is—" In so far as two notions or terms, both predicates, are either each positively, or the one positively and the other negatively, related to a common subject,—in so far are they positively or negatively subject and predicate, and this indifferently of each other."

The relation of the middle term in the second and third figures explains how it is that these figures have no determinate major or minor premise, and two in-

different conclusions. There can be no determinate major or minor premise; *for a determinate major premise* is one in which the middle term is compared with the greatest notion, and determined by it; *a determinate minor premise,* one in which the middle term is compared with the smallest notion, and determines it. The middle notion thus always is in the former *determined,* in the latter *determining.* Now, in the second and third figures there can be no such relation of determination. In one the middle term determines both the premises, in the other it is determined by both. Hence, since there is no determinate major or minor premise, it is manifest that we may have two indifferent conclusions; for we may, in the second figure, indifferently predicate one subject of the other, and in third the one predicate of the other.

In the first figure, again, it is equally clear that there is such a relation of determination. In it the reasoning is perfect, proceeding from the largest whole through a lesser whole to the least whole. The first figure accordingly has a determinate major and minor premise, and one immediate conclusion.

d. The true relations of the figures.

We have already spoken of the two wholes in which reasoning proceeds—the whole of comprehension and that of extension—the characteristic of the former being that the predicate is contained *in the subject,* of the latter that the subject is contained *under the predicate.* This being remembered, it will appear that in

the second figure, where the middle term as predicate contains both the subjects *under it*, *extension* will predominate. In the third, where the middle term as subject is contained under, and therefore *comprehends in* it both the predicates, *comprehension* will prevail. In the first figure, again, where the middle term is both subject and predicate, extension and comprehension balance each other. The first figure is indifferently competent to either.

Reasoning, however, proceeds not only in different wholes, but in different *aspects* of the same whole. We may, it is evident, regard any whole, considered as the complement of its parts, in either of two ways; for we may, on the one hand, look from the whole to the parts, and reason accordingly downwards; or, on the other hand, look from the parts to the whole they constitute, and reason accordingly upwards. The former of these reasonings is called *deductive*, the latter *inductive*. *Deductive* reasoning is founded on the maxim—"What belongs to the containing whole belongs also to the contained parts:" *Induction* on the contrary maxim—"What belongs to the constituent parts belongs also to the constituted whole." Thus in deductive reasoning the whole is stated first, and what is affirmed of it is affirmed of the parts it contains; in other words, a general law is laid down, and predicated of the particular instances to which it applies. In inductive reasoning the parts are first stated, and what is predicated of them is also predi-

cated of the whole they constitute ; in other words, the particular instances are first stated as facts, and then the law they constitute is evolved.

This being the nature of these counter and correlative reasonings, it appears to us, that though each kind is competent in either whole, (extension or comprehension,) yet that the reasoning in the whole of extension is more naturally allied to the *deductive*, and that in comprehension to the *inductive*. For, in the whole of extension, the reasoning proceeds from the general to the special—from the abstract to the concrete—from general laws to the particular instances which are contained under them ; while in that of comprehension, on the other hand, the reasoning proceeds from the special to the general—from the concrete to the abstract—from the particular instances to the general laws, whose operation they exemplify.

The special adaptation of comprehension for inductive, and of extension for deductive reasoning, might be illustrated more fully in detail, and on other grounds ; but it may perhaps suffice to have indicated the relation between the two kinds of reasoning, and the two counter wholes in which they proceed.

Considering these kinds of reasoning in relation to the figures, it will appear, then, that since extension prevails in the second, that will be so far more suitable for deductive reasoning ; and since comprehension prevails in the third, that figure will so far be more

adapted for inductive reasoning; while, since extension and comprehension prevail equally in the first, that figure will be equally fitted for either kind of reasoning.*

* [The relation of the figures to these different kinds of reasoning will be best illustrated by an example. We will take first the second figure:—

Deductive reasoning: Quantity of extension.

Fig. II.
Endowed with reason is all man.
European, Asiatic, African, American, are all man.
European, Asiatic, African, American, are endowed with reason.

Here the reasoning is *deductive*, for the law is first enounced, the individual instances are next brought under it, and it is then affirmed of them; it is *extensive*, for it proceeds from the wider notion through the narrower to the individual. Let us now take the same terms and treat them inductively, beginning with the individuals. The reasoning will then be in the whole of comprehension, and will naturally appear in the form of the third figure:—

Inductive reasoning: Quantity of comprehension.

Fig. III.
European, Asiatic, African, American, are all man.
European, Asiatic, African, American, are endowed with reason.
Endowed with reason is all man.

Here the reasoning is *inductive*, for beginning with the individuals in the premises, we arrive at the law (with which we started in the previous syllogism) in the conclusion; it is *comprehensive* or *intensive*, for it proceeds from the concrete to the abstract, from a greater totality of attribute to a less. In other words, in either quantity (extensive or intensive) we reason from the greatest whole; but in the quantity of extension the greatest whole is the most abstract notion, (*i.e.*, the widest law,) whereas in that of comprehension, the greatest whole is the most concrete notion, (*i.e.*, the individual instance.) But proceeding thus from the widest law the reasoning is necessary deductive, while on the other hand, proceeding from the individual instance, it is as necessarily inductive.

The second and third figures are indeed naturally respectively connected with deductive and inductive

We may give the same example in the first figure, to illustrate (what will now be quite obvious) that it is indifferently competent to either reasoning :—

Fig. I.

Deductive reasoning : Quantity of extension.

All man is endowed with reason.
European, Asiatic, African, American, are all man.
European, Asiatic, African, American, are endowed with reason.

Inductive reasoning : Quantity of comprehension.

European, Asiatic, African, American, are all man.
All man is endowed with reason.
European, Asiatic, African, American, are endowed with reason.

I need scarcely say, that at the time of writing the essay, I was quite unaware that any of these special relations of the figures had been noticed by logicians. I find, however, that Wilson, in his "*Rule of Reason,*" (1580,) has, among other remarks tracing the use of the figures, the following :—"*Use of the third figure:* This figure profiteth much in provoking particular things, and gathering of conjectures in causes that are doubtful, when probability only, and no assured knowledge, boulteth out the truth of a matter. And because several things (individuals) come sonest to our senses, we use suche gathering moste commonly, and by triall of particular causes, assure ourselves of the truthe generally." Again, "when we make an argument and procede from the general word (genus) to the kind (species), it is in the first figure, and even by our reason we learn this, that if the greater bee not, the lesse cannot bee."

"When we procede from the kinde to the general, making the conclusion particular, the argument is in the third figure. And this is for ever true, that when the kinde is rehearsed, the generall must needes followe." (Fol. 30-1.) This, however, is little beyond a more explicit statement of what is commonly said of the third figure, that it is a reasoning from the special.]

reasoning ; for in the second we judge the likeness or unlikeness of two parts, as they are contained or not contained by a common whole ; while in the third we judge the likeness or unlikeness of two wholes, as they severally contain or do not contain common parts.

3. *Syllogisms differ with respect to mood.*

The syllogistic variety of mood arises from the different quality and quantity of propositions, and this difference is determined by the supreme canon in the clause—" *What worse relation of subject and predicate,*" &c., since a negative quality is a worse relation than a positive, and a particular quantity a worse relation than a universal.

Logicians, however, in their enumeration of moods, as we have seen, have taken into account only one quantity of propositions ; have considered the subject as quantified to the exclusion of the predicate ; and have, in so doing, deformed their science by excluding from it many valid forms of reasoning—forms which logic, if it be an exact science, and its analysis of the form of thought exhaustive, is bound to recognise and vindicate as valid.

It is the design of the "new analytic" that its analysis shall be thus exhaustive ; and it vindicates its title by discovering and developing, in its various relations, an element of formal thought which had remained undeveloped, if not unrecognised, in every previous analysis. That element is, as we have

said, the express quantification of the predicate, the true application of which recalls to the science many true forms of reasoning, the date of whose logical proscription may be reckoned as coeval with that of the science itself.

We shall proceed briefly to vindicate these forms. Logicians, combining the quality of a proposition with the quantity of its subject, reckon in all four kinds of propositions; and combining these propositions in every possible way, evolve sixty-four moods. But it is clear, that if the quantity of the predicate be taken into account, the various kinds of propositions discriminated by quantity and quality will be doubled in number, and a proportionate increase effected in the number of possible moods; for we shall now have eight kinds of propositions, viz., four affirmative :—

Definite, affirmative, definite.
Definite, affirmative, indefinite.
Indefinite, affirmative, definite.
Indefinite, affirmative, indefinite.

And in the same manner, four negative propositions. With this increase in the number of propositions, we need new symbols by which to designate them. We may, however, still retain the old notation A. I. E. O., and express the new forms by combining the letters into diphthongs, or placing them within brackets, as occasion may require; *e.g.*,—

Definite, affirmative, indefinite = (AI.)
Indefinite, negative, definite = Œ, &c.

This increase in the number of propositions to be combined effects of course a great increase in the number of moods resulting from such combination. Of the possible moods thus given, a number are invalidated by the clause of the canon, "*one at least positively so,*" from having two negative premises. A number more are excluded by the clause, "*a common third term,*" from the middle term being undistributed. Throwing these out of account, together with some others having particular conclusions where universal are competent, *there remain in all thirty-six valid moods,* (twelve affirmative and twenty-four negative,) and these thirty-six are valid in each figure.

We employ the symbolical notation,* using the comma (,) to denote "some," (indefinite quantity,) and the colon (:) to denote "all," (definite quantity).

Valid moods of the first figure.

	Affirmative.	Negative.
i.	A : — : B : — : C	1. A : + : B : — : C 2. A : — : B : + : C
ii.	A , — : B : — , C	1. A , + : B : — , C 2. A , — : B : + , C
iii.	A : — : B : — , C	1. A : + : B : — , C 2. A : — : B : + , C

* On this system of notation, see the Appendix.

iv. A , —— : B : —— : C { 1. A , —+— : B : —— : C ; 2. A , —— : B : —+— : C

v. A : —— : B , —— : C { 1. A : —+— : B , —— : C ; 2. A : —— : B , —+— : C

vi. A : —— , B : —— : C { 1. A : —+— , B : —— : C ; 2. A : —— , B : —+— : C

vii. A , —— : B , —— , C { 1. A , —+— : B , —— , C ; 2. A , —— : B , —+— , C

viii. A , —— , B : —— , C { 1. A , —+— , B : —— , C ; 2. A , —— , B : —+— , C

ix. A : —— : B , —— , C { 1. A : —+— : B , —— , C ; 2. A : —— : B , —+— , C

x. A , —— , B : —— : C { 1. A , —+— , B : —— : C ; 2. A , —— , B : —+— : C

xi. A , —— : B , —— : C { 1. A , —+— : B , —— : C ; 2. A , —— : B , —+— : C

xii. A : —— , B : —— , C { 1. A : —+— , B : —— , C ; 2. A : —— , B : —+— , C

We have given the above syllogisms in the first figure; but they may all be easily translated into the two others.*

* [The only one of the prescribed requisites which the essay does

To recapitulate then. We set out with the principle of a quantified predicate. We have noticed some things by the way not immediately connected therewith; but recurring to it, we have endeavoured to vindicate that principle. We have indicated its influence on propositions in abolishing the complex doctrine of conversion; its influence on categorical syllogisms, in reducing their laws to a higher simplicity, and amplifying their valid forms,—in short, by correcting what was false, and supplying what was wanting; and thus, by securing to logic a higher degree of formal exactness, realising for it a higher degree of scientific perfection.

not to some extent attempt to meet, is that in which it is required "to show in concrete examples, through all the moods, the unessential variation which figure makes in a syllogism." This was omitted at the time of writing through haste; but it is so obvious, that with a little trouble, each reader may do it for himself. As an illustration, however, the following is a concrete example of the first mood, carried through all the figures:—

Fig. I.
All man is some animal.
Every Celt is some man.
Every Celt is some animal.

Fig. II.
Some animal is all man.
Every Celt is some man.
Every Celt is some animal.

Fig. III.
All man is some animal.
Some man is every Celt.
Some animal is every Celt.

Fig. IV.
Some animal is all man.
Some man is every Celt.
Some animal is every Celt.

The "*new analytic*" accomplishes this by being true to its office, and fully investigating the form of thought. *The form, the whole form, and nothing but the form of thought,* is indeed the bannered motto which it bears on its triumphant way. True to its purpose, it advances over the whole region of formal thought, conquering and to conquer; destroying the false landmarks which had been set up by the early discoverers of that territory; repressing the incursions which were continually made into neighbouring kingdoms; destroying the border ground by determining for ever the frontier line; dethroning the potentates who had intrenched themselves in its high places, and long there exercised a usurped authority; recalling from their long exile the true lords of the soil; re-establishing the laws on which their rights were founded, and enforcing strict obedience to these in every province of the empire. Thus, though in some respects its path is as the path of the destroyer, in a higher and truer sense it is the path of peace; for through its instrumentality there breaks at length upon this long distracted region the golden age of simplicity and order. And anarchy, the result of laws neglected and rights ignored, is for ever abolished in the establishment of perfect harmony—a harmony the result of law clearly expounded and rigidly obeyed throughout the entire empire of formal thought.

In conclusion, we are well aware of the very imperfect manner in which we have signalised those parts of the new discovery on which we have touched. We cannot, however, close without expressing the true joy we feel, (though, were the feeling less strong, we might shrink from the intrusion,) that in our country, and in our time, this discovery has been made. We rejoice to know that one has at length arisen, able to recognise and complete the plan of the mighty builder, Aristotle,—to lay the top-stone on that fabric, the foundations of which were laid more than two thousand years ago by the master hand of the Stagirite, which, after the labours of many generations of workmen, who have from time to time built up one part here and taken down another there—remains substantially as he left it; but which, when finished, shall be seen to be an edifice of wondrous beauty, harmony, and completeness.

APPENDIX.

No. I.

HISTORICAL NOTICE TOUCHING THE EXPLICIT QUANTIFICATION OF THE PREDICATE.

THE statement made in the first page of the Essay, that "the principle of a quantified predicate had, in its full scientific significance, been totally overlooked by logicians, and that, when noticed at all, it had, for the most part, been referred to only to be discarded as useless, if not to be condemned as false"—was made, it scarcely need be said, upon a very limited acquaintance with logical works. It was, however, the conclusion to which my inquiries, so far as they extended, led me. I had examined several logical treatises, and found that the majority made no reference at all to a quantified predicate, that the few who noticed it, (two of which are quoted,) treated it in the manner described in the text; while, so far as my reading extended, I had not found a single instance in which it was admitted in any form. Since writing the Essay, I have naturally been curious in my occasional logical reading to mark any references which might be made to this subject; and as the result of a somewhat fuller knowledge of the historical development of the science, I am able to establish, upon somewhat wider evidence, the general truth of the statement made in the text. The full scientific significance of the principle certainly never has been appreciated. It has been, "for the most part, rejected;" that is to say, it has been denounced by the vast majority of logicians as

useless and false. Some exceptions, however, to this summary rejection of the principle are to be found. A few of these I have met with, some of which as in themselves curious, and as lying out of the way of ordinary reading, it may be worth while explicitly to notice. In order, therefore, to place the Essay on a level with my present knowledge, I shall briefly establish historically the common rejection of the principle of a quantified predicate, and then notice some of the exceptions to this treatment of it which are to be found.

I. *The common doctrine which altogether rejects the express quantification of the predicate.*

This doctrine dates substantially, as do most logical truths and heresies, from Aristotle. He refers explicitly in two places*—in his *Book on the Doctrine of Enunciation*, and in his *Prior Analytics*—to the quantification of the predicate, and in both rejects it in a very summary manner. In the Book touching Enunciation he says,—"Ἐπὶ δὲ τοῦ κατηγορουμένου καθόλου τὸ καθόλου κατηγορεῖν, οὐκ ἔστιν ἀθηλές· οὐδεμία γὰρ κατάφασις ἀληθὴς ἔσται, ἐν ᾗ τοῦ κατηγορουμένου καθόλου τὸ καθόλου κατηγορεῖται οἷον ἔστι πᾶς ἄνθρωπος πᾶν ζῶον." (*De Enunciandi Ratione*, c. vii. § 4.) The parallel passage in the *Prior Analytics* is as follows: "Αὐτὸ δὲ τὸ ἐπόμενον οὐ ληπτέον ὅλον ἔπεσθαι· λέγω δ', οἷον ἀνθρώπῳ πᾶν ζῶον, ἢ μουσικῇ πᾶσαν ἐπιστήμην· ἀλλ' ἁπλῶς μόνον ἀκολουθεῖν, καθάπερ καὶ προτεινόμεθα· καὶ γὰρ ἄχρηστον θάτερον, καὶ ἀδύνατον, οἷον πάντα ἄνθρωπον εἶναι πᾶν ζῶον· ἢ δικαιοσύνην ἅπαν ἀγαθόν." (*Anal. Pri.* i. c. 27, § 9.) The quantification of the predicate is to be absolutely rejected; such is the judgment of Aristotle on the point.† That this judgment was given rashly and without

* Other references are made to the subject by Aristotle in the *Book of the Categories* and the *Posterior Analytics*; but the above are the most decisive passages.

† It is right to state, that the only case which is here explicitly contemplated by Aristotle, is that in which the predicate is quantified *universally*. His dictum, however, in relation to this is not true, since we may often

due consideration is, however, manifest, both from the fact that Aristotle himself explicitly quantifies the predicate in other parts of his writings, as also from the fact that his formal rejection of such quantification is unsupported by a single argument. All that is offered in its defence is an illustration so inept and one-sided, that its fallacy seems almost transparent. He says, in effect, that it is impossible to quantify the predicate, because it is false to say, *all man is all animal;* which is surely no better as an argument than it would be to say, that it is impossible to divide a foot into inches, because it is false to say that *one inch is a whole foot.* With the exception of this example, and one or two others of the same kind, Aristotle wisely abstains from offering any defence of his hasty judgment. His wisdom in this respect has not, however, been imitated by his followers, who have, in various ways, endeavoured to explain and defend the dictum of their master.

Passing over the Greek commentators, (with whose labours I am not sufficiently familiar to enable me to speak of them with confidence,) we come to the first, as in some respects he still remains the best Latin expositor of Aristotle—Boëthius. Boëthius flourished during the latter part of the fifth and the beginning of the sixth centuries. He translated all the books of the Organon, and wrote elaborate commentaries on more than one, besides furnishing other and more direct contributions to logical science in the form of original treatises. To his versions and commentaries the schoolmen were mainly indebted for their knowledge of Aristotle; and to these, accordingly, may be traced several of the particular interpretations which subsequently became current in the science, and were, indeed, for the most part authenticated as of Aristotelic origin. To determine, therefore, the opinion of Boëthius on any particular point,

quantify the predicate universally; but as he implicitly makes this case representative of the whole doctrine, it is obviously altogether false, since we may, and must always quantify the predicate *unirersally* or *particularly.*

is of some importance, as it will be often found to be that which subsequently prevailed.

He gives the point in question fuller consideration than it receives at the hands of Aristotle; but in his treatment of it, nevertheless, he confines himself to the same restricted aspect, and arrives substantially at the same one-sided conclusion. Considering exclusively the case in which the predicate is quantified *universally*, he proves triumphantly what seems to require really very little proof, that the genus cannot receive a mark of universal quantity when it is predicated of its species. Commenting on the passage already quoted from the Book touching *Enunciation*, he says as follows:—

"Quod dicit hujusmodi est:—Omnis propositio simplex duobus terminis constat, his sæpe additur aut *universalitatis* aut *particularitatis determinatio;* sed ad *quam partem* hæ determinationes addantur, exponit. Videtur enim Aristoteli, prædicato termino determinationem non oportere conjungi. In hac enim propositione, quæ est 'homo animal est,' quæritur—subjectumne debeat cum determinatione dici, ut sit 'omnis homo animal est;' an prædicatum, ut sit 'homo omne animal est;' an utrumque, ut sit 'omnis homo omne animal est.' *Sed neutrum eorum quæ posterius dicta sunt, fieri oportet; namque ad prædicatum nunquam determinatio jungitur, sed ad subjectum tantum.* Neque enim verum est dicere 'omne animal omnis homo est;' idcirco, quoniam *omnis prædicatio*, aut *major* est *subjecto*, aut *æqualis*. Ut in eo quod dicimus, 'omnis homo animal est,' plus est animal quam homo. Et rursus in eo quod dicimus, 'homo risibilis est,' risibile æquatur homini. Ut autem sit minus prædicatum atque angustius subjecto, fieri non potest. Ergo in *his predicatis* quæ subjecto *majora* sunt, ut in eo quod est animal, perspicue *falsa* est propositio, si determinatio universalitatis ad prædicatum terminum ponitur. Nam si dicamus, 'homo est animal,' animal, quod majus est homine, per hanc determinationem ad subjectum hominem usque contrahimus; cum non solum ad hominem, sed

ad alia quoque, nomen animalis possit aptari. Rursus, in iis quæ *æqualia* sunt, idem evenit. Nam si dicam, ‘ omnis homo omne risibile est,’ primum, si ad *humanitatem* ipsam referam, *superfluum est adjicere determinationem.* Quod si ad *singulos* quosquam hominum, *falsa* est propositio ; nam cum dico ‘ omnis homo omne risibile est,’ hoc videor significare, singuli homines omne risibile sunt, quod fieri non potest. *Non igitur ad prædicatum, sed ad subjectum determinatio ponenda.* Verba autem Aristotelis, hoc modo sunt, et ad hanc sententiam ducuntur :—‘ In his prædicatis quæ sunt universalia, his adjicere universale aliquid, ut universale prædicatum universaliter prædicatur, non est verum ;’ hoc enim est quod ait. In eo vero quod prædicatur universaliter, id est, quod habet prædicatum universale, ipsum universale prædicatum [prædicare] universaliter, non est verum. In prædicato enim universali, id est, quod universale est et prædicatur, ipsum prædicatum, quod universale est, universaliter prædicare, id est, *adjecta determinatione universalitatis, non est verum. Neque enim potest fieri, ut ulla sit affirmatio vera, in qua de universali prædicato universalis determinatio prædicetur ;* eisque rei notionem exemplo aperit, dicens, ‘ ut omnis homo omne animal est ;’ hoc autem quam sit inconveniens, supra jam diximus.” (*Opera Omnia. Basil.*, pp. 348, 349.)

In the opening sentence of this (corrected) extract Boëthius states the question fairly, and looks at it from a higher point of view than that in which it had been considered by Aristotle. He begins by saying, that every simple proposition is composed of two terms, that to these a determination of *universality* or *particularity* is often added, and then proceeds to inquire to which of the terms *these* determinations should be affixed. From this introduction it might reasonably have been inferred that the question would be discussed on broader grounds than those on which it had previously been treated, and that quantification in relation to the predicate would be considered in its generic latitude, and not in one of its species alone. This expectation is,

however, as we have said, not fulfilled; for immediately after having said that the terms receive marks of *universality* and *particularity*, and that the inquiry is, to which of the terms these marks should be appended, Boëthius proceeds to consider the mark of *universality* alone; and decides on this restricted consideration of the matter, that the marks of quantity are to be affixed exclusively to the subject, and never to the predicate.

The whole passage is, however, curious and valuable, not only in itself, but also in its historic relation, from its having (as already hinted) determined in effect nearly all that was subsequently said by others on the subject. There is not, I think, in all the subsequent refutations of a quantified predicate which have been attempted, a single argument which is not substantially contained in this quotation.

The next name of authority after Boëthius is that of the Arabian Averroes, who, from the extent and value of his labours, as expositor of Aristotle, was called *The Commentator*, κατ' ἐξοχήν. He flourished in the twelfth century, and by his almost incredible devotion to Aristotle, and his unwearied zeal in expounding and epitomising his works, contributed not a little to promote the complete ascendency which the peripatetic philosophy subsequently obtained.

Averroes treats the point in question with much greater brevity than Boëthius, but arrives at precisely the same conclusion.

In his commentary on the passage in the *Book of Enunciation*, he says, "Et non dividuntur enunciationes ex parte conjunctionis clausuræ cum prædicato; quia, clausura cum *adjungitur prædicato*, est *falsa* enunciatio, aut *superflua;* et falsa quidem est, 'omnis homo est omne animal;' superflua sicut cum diximus, '*omnis homo est quoddam animal.*'" (*Averrois Opera omnia.* Venet. 1560. Tom. i. fol. 45.) He has another sentence to the same effect in his commentary on the twenty-seventh chapter of the first book of the *Prior Analytics.* It is as follows—"Oportet

ut sepimentum (hoc est determinatio) semper coaptetur subjecto propositionis acceptæ, *non autem prædicato*, quoniam si conjungetur prædicato, erit aut *impossibilis*, aut *inutilis* ad syllogismum, secundum quod declaratum fuit in libro præcedente." Fol. 118.

The first of these extracts from Averroes, though so brief, is curious, inasmuch as he there explicitly takes account of what is not noticed by Aristotle or Boëthius before him, or, as far as I remember, by any of the rejectors of a quantified predicate after him,—the case, to wit, in which the predicate is quantified *particularly*. He considers, with Aristotle, first, the case in which it is quantified *universally*, " all man is all animal," and, with him, rejects this as false and impossible. He then proceeds to consider the case in which it is quantified *particularly*, " all man is *some* animal;" here he was free to act as he would, for of this second case nothing had been said; but the spell of Aristotle's rejection of the universal quantification was still strong upon him, and accordingly he rejects the *particular* also as *superfluous* and *useless*. The grounds of this rejection are, it need scarcely be said, totally extra-logical; for the particular quantification of the predicate in the given example is *superfluous* only by an appeal to the *matter of the proposition*, with which logic has nothing whatever to do; and so far from being *useless*, such quantification is *absolutely necessary*, before the predicate notion, as the constituent of a reasoning, can be turned to its full scientific account.

From Boëthius and Averroes, the logical treatises of Aristotle, with the traditions founded upon them, passed, as we have said, to the schoolmen; among these Albertus Magnus and St. Thomas Aquinas are quoted as having anew defended the rejection of a quantified predicate. The hereditary confession of logical faith, now become venerable through constant subscription, passed from the schoolmen to the later commentators on the Organon. These, while throwing off, to a great extent, the formality of the scholastic style, are yet rarely wise in im-

portant points above the teaching of their masters. On the point in question, that of a quantified predicate, they seem to have remained, with scarcely an exception, faithful to the received traditions. In illustration of this we will take two, which are among the best and most valuable of the later commentaries on the Organon, that of *Julius Pacius*, and that of the *College of the Society of Jesus at Coimbra.*

Julius Pacius, the pupil of Zabarella, and preceptor in philosophy of Casaubon, was both a very learned and a very acute man; and his works accordingly exhibit the accuracy and penetration resulting from these blended excellencies. His commentary on the Organon was first published in the year 1597. It was so full, clear, and precise, and altogether such a useful book, that it speedily attained a high reputation, and has ever since maintained its place as a standard work on the Organon. Pacius discusses the question of a quantified predicate in connexion with both the passages which we have quoted from the Organon; and as his opinion in this matter stands in much the same relation to the later philosophy as that of Boëthius did to the earlier, it may be worth while to quote it in full. The more so, too, as it is in itself the fullest discussion of the matter probably to be found among the later writers.

The first passage is from his Commentary on the *Book of Enunciation;* it is as follows :—

" In duabus primis particulis sejunxerat indefinitas ab universalibus; quoniam universales subjecto universali addunt notam universalem *omnis*, vel *nullus;* indefinitæ verò nullam notam subjecto apponunt. Unde potuisset aliquis suspicari tale discrimen, quod modò exposuimus in subjecto, nempe recipere notam universalem, aut eâ notâ carere, tale (inquam) discrimen etiam in attributo spectari posse; quasi vel simpliciter proponi possit, vel cum nota universali. Hunc errorem ut Aristoteles tollat, ostendit *universalem notam nunquam posse adjungi attributo :* quia tunc omnis affirmatio *falsa* esset.

Quod declarat exemplo hujus enunciationis, 'omnis homo est omne animal,' quæ sine dubio falsa est: nam si homo esset omne animal, esset etiam asinus et bos. Sed notare hic oportet, alia attributa latius patere quam subjecta, alia verò reciprocari cum subjectis. Hoc est quod dicebat Porphyrius, cap. 2, pars 37, aut majora de minoribus aut æqualia de æqualibus dici. Ubi igitur attributum latius patet, ut in exemplo Aristotelis, res dubitatione caret: certum enim est, affirmationem esse falsam, nec posse dici, 'omnem hominem esse omne animal.' Sed meritò dubitatur de attributis, quæ reciprocantur cum subjectis, veluti si quis dicat, 'omne animal est omne sensu præditum,' et 'omnis homo est omne aptum ad ridendum:' nam hic absurditas illa non æquè apparet, ut in illa enunciatione, 'omnis homo est omne animal.' Sed ut intelligatur has quoque enunciationes esse falsas, in quibus attributum, quod reciprocatur, adnexam habet particulam *omnis*, notare oportet, hanc particulam *omnis*, habere vim quam in scholis vocant distributivam; ut omnis homo, proinde valeat atque quilibet homo, vel *singuli homines;* et similiter omne animal, idem valet, quod singula animalia, vel unumquodque animal seu quodlibet animal. Quapropter si verè diceretur, 'omne animal est omne sensu præditum,' etiam homo esset omne sensu præditum; nam qui dixit omne animal, non exclusit omnem hominem, homo igitur esset quodlibet sensu præditum: proinde hac ratione fieret, ut homo esset equus, et bos, quandoquidem equus et bos sunt sensu prædita." (*Pacius in Aristotelis De Interpret.* cap. vii.)

The second passage is from the commentary on the *Prior Analytics*, and is as follows:—

"Quintum præceptum est, ne sumamus consequens, quod totam consequatur, sed quod toti sit consequens: id est, ut nota universalis *omnis* vel *omne*, jungatur subjecto, non attributo propositionis. Primò, Aristoteles proponit hoc præceptum. Deinde, cum ait, 'verbi gratiâ,' præceptum illud exemplis illustrat. Tertiò, cum ait, 'quonium alterum,' duplici argumento præcep-

tum illud confirmat. Primum est; quia si sumas id, quod totum consequitur, pars ejus erit inutilis, et ad rem non faciat. Alterum argumentum est; quia propositio erit impossibilis, id est, necessario falsa. Posterius argumentum declarat his exemplis, 'omnis homo est omne animal,' et 'justitia est omne bonum.' Nam hæ propositiones sunt evidenter falsæ, ut etiam expositum fuit *Capite* 7, *De Interp. Partic.* 4. Prius argumentum ab Aristotele non explicatur, ideoque a nobis est breviter explicandum. Ergo etiamsi verè dici possit, omnem hominem est omne animal; tamen illud *omne* nihil faceret ad concludendum problema; tantumdem enim valet hæc propositio, 'omnis homo est animal.' Exempli gratiâ, si probandum sit, omnem hominem, vivere; et primum, sumatur hæc propositio, 'omne animal vivit;' si addas assumptionem, quod 'omnis homo est animal,' etiamsi non sumas esse omne animal, tamen rectè colliges omnem hominem vivere. Postremo, cum ait, 'sed cui [aliud]' concludit universalem illam notam *omnis*, esse subjecto adjungendam." (*Pacius in Arist. Analyt. Pri.* i. cap. 27, § 9.)

The commentary on the Organon by the *College of Coimbra* was first published in the year 1600, a few years after that of Pacius. It was one of those able works on philosophy to which, after the decline of scholasticism, the zeal and energy of the Jesuits in letters and philosophy gave birth. It is far from being a mere slavish transcript from previous writers, but has on the contrary acuteness and originality enough to enable it to stand out in its individuality from the works of the time. In relation to the point in question it is, however, in harmony with its predecessors and contemporaries. The following is its deliverance on the matter:—

"Docuerat (Aristoteles) in propositionibus universalibus signa universalia addi subjecto, ambigeret quis, an prædicato etiam addi oporteret, ut quemadmodum dicimus, 'omnis homo est animal,' libeat ita loqui, 'omnis homo est omne animal:' respondet negativè in affirmativis, quia aliter *omnis affirmatio uni-*

versalis falsa esset, veluti si dicas, 'omnis homo est omne animal,' neque enim omne animal in homine est. Notanter, addit Aristoteles, nulla erit affirmatio vera, quia in quavis materia, etsi *prædicatum æquale* existat *subjecto*, propositio erit *falsa*. Nam sensus hujus propositionis, 'omnis homo est omne risible,' est quod *hic* homo est omne risible, et *ille* homo est omne risible, distribuit enim particula *omnis*, subjectum copulativè pro omnibus. Unde patet, quam errent Averroes et Boëthius existimantes addi posse signum universale prædicato, universalis propositionis, quando illud exæquat subjectum: nisi propositionis accipiant non copulativè præter earum usum et naturam. De *negativa propositione* nihil docet quia in ea, etsi negatio addi possit prædicato absque falsitate, superflua tamen est, quia virtute præcedentis negationis ad omnia extenditur prædicatum." (*Comment. Coll. Conimbr. in universam Dialecticam Aristotelis.* Colon., 1611. Pars ii. p. 158.)

I confess that Boëthius and Averroes appear to me to be but hardly treated in the above passage, in being held guilty of error for saying that the universal quantification of the predicate, when it was equal in extent to the subject, was simply superfluous, instead of denouncing it as false. Boëthius, indeed, as we have seen, hypothetically does the latter, but considers the whole case with far greater wisdom than his censor, since he says in relation to it, that the quantification is *superfluous*, if the subject be taken *collectively*, but *false* if it be taken *distributively*. With the exception of the admission that the predicate of a negative judgment may be quantified, without making the proposition false, the above extract is at one with the previous authorities.

Keckermann adds nothing new, save one example, (which is, however, something, where the whole question is solved by examples,) if possible, still more inept, not to say absurd, than the common ones. A number of other logical writers, about equal in authority to Keckermann, such as Burgersdyk,

Hereboord, Stahl,* Derodon, &c., might be referred to as giving deliverances to the same effect. There is nothing, however, in their statement of the common opinion that merits special attention, or that need be quoted here.

Such is the position which the opinion of the illegality of quantification in relation to the predicate has maintained in the history of the science. It has been held from the earliest to the latest times. Nor is it by any means yet obsolete. With the exception of the comparatively few quarters in which Sir W. Hamilton's refutation of the old, and application of the new doctrine, have become known, it is as firmly and as widely held today as it ever was. The marvellous acuteness of Kant, in relation to everything connected with formal thought, which did good service in other parts of logic, brought no help here. Nor has the newly-kindled zeal on behalf of Aristotle and his philosophy, manifested in Germany and France, been of any more avail. The last German editor of the Organon, Theo. Waitz, still says, on the classical passage in the Book of Enunciation,—"Quum additur 'omnis,' non id de quo prædicatur universale esse significatur, sed de re aliqua universa aliquid prædicari judicatur. Si vero quod prædicatur, quum universale est, universum prædicatur, *enunciatio exit non vera.*"—(*Aristotelis Organon, Edidit T. Waitz.* 1844. Pars i. p. 337.) Finally, the last French translator and expositor of Aristotle, M. J. B. Saint-Hilaire, in his excellent version of the Organon,

* Stahl and Derodon have been quoted already in the Essay. While referring again to Stahl, I may mention here what ought to have been stated in the note respecting him at page 2, viz., that in what he says of *comprehension* and *extension*, he but repeats Cajetanus, quoted, indeed, himself to the same effect earlier in his work. (*Reg. Phil.*, p. 381.) The work of Cajetanus on the categories from which Stahl quotes, dates from 1496, so that the discrimination of these quantities by the epithets *extensive* and *intensive* is of some antiquity. The term *intensive* was commonly employed in the Leibnitian school in the same sense, and was probably revived by Leibnitz, immediately from Cajetanus, or mediately through Stahl.

still reiterates, without a reason, in his notes, the rejection of the text:—" L'attribut n'a jamais la marque d'universalité : et l'on ne saurait dire : Tout homme est *tout* animal : on dit simplement et d'une manière absolue : Tout homme est animal. Le signe d'universalité n'est jamais qu' à l'antécédent, c'est-à-dire, au sujèt."—(*Logique d'Aristote, trad.* Paris, 1839. Tom. ii. p. 125.)

To sum up, then, the evidence we have obtained, the whole question, as commonly treated by the logicians, may be stated as follows:—The predicate, they consider, (with a single exception,) can only be quantified *universally*. Now, this being the only possibility contemplated, two cases arise ; for either, in the *first place*, the predicate is *greater* than the subject, and then such quantification is *false*, as "all man is all animal;" or it is *equal* to the subject, and then such quantification is *superfluous*, as " all man is all risible." The later commentators, however, are not satisfied with this comparatively mild dismissal of the second case, but maintain, that in *any case*, in the latter as well as in the former, the quantification is necessarily *false ;* and this on the apparently inconceivably inconsequent ground, that if *all man* is all risible, then necessarily *each man* is all risible ; or to take a parallel example, (one, however, which they do not take,) that if *twelve inches* are one foot, then necessarily *each individual inch* is also one foot.

When we consider these grounds, and remember the real ability of the men by whom they were successively urged, we cannot but be struck with a wonder amounting to marvel, that they could remain satisfied with them, and that a truth so obvious on its first enunciation, so imperative on its fuller exposition, should have been so uniformly and so long thus rejected. Allowing that the original judgment of Aristotle was given rashly upon but a partial consideration of the subject, we still cannot at all understand how his followers should not, on the one hand, having undertaken its examination, have discovered its fallacy,

or, on the other, having adopted and undertaken to defend it, have offered something better—something at least not absurd—in its vindication. It is, however, but another instance, perhaps the most illustrious of all, of what has been often noticed, of how completely the weight of authority often prevails against the clearest evidence. As in physical science the older philosophers refused to believe the evidence of their senses against the recorded judgment of Aristotle, so in mental science they refused to accept the equally obvious evidence of their understandings, where it testified against the same infallible authority.

The only explanation which can be offered of this strange oversight, and it is probably the true one, is, that the logicians for the most part (after Aristotle) limited their attention to the single case of universal quantification. This, considered in relation to the rules which were already laid down for predication, according to which the predicate notion was always of greater extent than the subject notion, would not only naturally, but necessarily lead to the rejection of such one-sided quantification.

Some exceptions do, however, as we have said, occur, in which the subject is looked at in a wider aspect, and to these it is time that we should more explicitly refer.

II. *Some exceptions to the common doctrine, in which the principle of a quantified predicate receives a more enlightened consideration, and is partially, either in principle or practice, formally allowed.*

Laurentius Valla was, so far as I know, the first by whom the express quantification of the predicate was in any form, or to any extent allowed. And if, indeed, the force of the tradition against it was ever to be broken through, this was a service which we might naturally have expected to receive at his hands, since he was assuredly one of the most independent and active thinkers, not alone of his own, but also of any age. The same

originality of which his life and writings were the constant expression, characterises also his logical inquiries. He complained of the diffuseness and defects of the existing logic, undertook a thorough examination of its doctrines, and accepted none but such as appeared founded on the truth of things. Whatever, therefore, rested simply on authority he at once threw aside, while whatever appeared to have scientific evidence in its favour he with equal readiness adopted. As the result of this thorough independence, he was doubtless sometimes led into error, from which an adherence to authority would have preserved him; but he was often also led into truth, to which the force of authority would as certainly have denied his access; so that on the whole he certainly introduced more truth than error into the science, and had he been less hasty and capricious, the result of his labours would probably have been still more valuable. As it is, however, his treatise has all the freshness and vigour of independent thought, and with no loss of accuracy, possesses the rare merit of being a really interesting introduction to a science not proverbial for the attractiveness of its elementary works.

Valla flourished during the first half of the fifteenth century, having been born at Rome in 1408, and dying in 1457. His logical work, *De Dialectica*, dates therefore from the middle of that century. I cannot find, however, any account of a printed edition of it before the one published at Venice in the year 1499, though in all probability it must have been printed much earlier. From the title of this earlier edition, "*De Dialectica contra Aristoteleos*," it would seem at first to have been avowedly published against the logicians of the day; as it is quite certain, from his short defence of himself at the close of the work, that Valla did not escape severe censure, and indeed persecution. The boldness of his criticisms on the current doctrines, indeed, (though these were coupled for the most part with the most respectful references to Aristotle himself,) when taken in connexion with the enmity aroused by his

stubborn adherence to the truths which he had obtained by his own industry, and his contemptuous rejection of those which were merely traditional;—his criticisms, we say, taken in connexion with the enmity which his conduct in these respects had excited, were likely enough to provoke active and fierce opposition. His attack (or what seemed an attack) upon the time-honoured and sacred fortress of the Aristotelic logic, would naturally be the signal for a general assault on the part of his enemies. There are none, however, but must be struck with the calm beauty and dignity of his protest against the meanness and the malice of the persecutions to which he had been subjected for his defence of what he held to be the truth; and none, too, however wayward, haughty, and petulant that defence may sometimes have been, who will not heartily respond to the noble sentiment with which he closes:—"Verum Imperator noster, Deus, milites suos ex acie fugere non vult; sed aut vincere, aut strenue fortiterque pugnantes, mortem oppetere. Non enim ipsis pereuntibus veritatis gloria perit, sed vivit, sed vincit, sed illo piissimo cruore sancitur, atque consecratur." For myself I feel that I could freely forgive the errors of his life had they been far more serious than they were, when I find him consciously upheld by such high inspiration; and see that amidst all its pride and storm he cherished so sincere a love for the truth, and so stern a determination to defend it, against all odds, and at every hazard.

Some apology, we feel, is due for having dwelt so long upon the man, when it is, in strictness of speech, with his doctrine that we are here alone concerned. We trust that this may be found in the fact, that he is at once the least known, and the best worth knowing of all logical writers. To return, however, to his work,—the only edition of this with which I am acquainted is that printed at Paris in the year 1530, 4to, and it is from this accordingly that I uniformly quote. This edition has not the title given above, but simply the following,—"*Laurentii*

Vallæ Romani De Dialectica, libri iii." In this work, as we have said, Valla allows the express quantification of the predicate in theory, and to a certain, but very limited extent, adopts it in practice. Before, however, referring to the passages* which contain the evidence of this, it may be worth while to look for a moment at what he says of *Conversion*. This is very curious and acute; and though it does not explicitly bring out his doctrine of the predicate, will yet very well serve as introductory thereto. In his chapter, "*De Convertenda Enunciatione*," he says as follows:—

"Hic locus admonet ut aliqua de conversione dicamus: nam licet major atque amplior significatio prædicati fere sit quam subjecti, sicut ostendi; non tamen amplius ac latius *accipitur prædicatum* quam subjectum. Ideoque cum illo converti potest, ut 'omnis homo est animal,' non utique *totum genus* animal, sed *aliqua pars* hujus generis; nam Cicero speciem partem generis vocat; *ergo aliqua pars animalis est in omni homine*. Item 'quidam homo est animal,' scilicet est *quædam pars animalis;* ergo 'quædam pars animalis est quidam homo.' 'Omnis leo est rutilis,' 'quidam leo est rutilis;' hoc est, quod quisque leo, et quidam leo partem aliquam habet sive quandam rutili coloris, non ipsum omnino rutilum colorem; ergo *aliqua pars rutili coloris* est in singulis leonibus, et quædam in quodam. Idem intelligo de infinito quod de universali, cum universaliter accipitur. Idem quoque de particulari singularique, cum particulariter singulariterque significat: nec aliter, cum totaliter accipitur, ut 'homo est *species* animalis,' id est *quædam species* animalis; ergo '*quædam animalis species est homo*.' In negatione ratio e diverso est, quando adest signum universale; ut 'nullus homo est satyrus,' id est 'nullus homo non [?] est ullus satyrus;' ergo

* I may state at once that I do not profess to give *all* the references to this subject which may be found in Valla. I give only the passages which I marked in a former reading, undertaken without express reference to the doctrine of the predicate. The urgency of the press is too great to allow of my going through it carefully again with this end specially in view.

'nullus satyrus non [?] est ullus homo.' Quando non adest, ut 'homo non est satyrus,' id est, '*ullus homo*,' '*ullus satyrus*;' ergo, 'ullus satyrus non est ullus homo.' Quando per totalitatem loquimur, ut 'satyrus non est *species* hominis,' id est, '*ulla species* hominis,' ergo '*ulla species hominis non est satyrus.*' Quando adest signum particulare singulareve, ut 'nonnullus piscis,' vel 'hic piscis fœtum enititur,' scilicet est aliquis ex illis piscibus qui fœtum enituntur; ergo aliquis ex piscibus fœtum enitentibus est aliquis, vel est hic. Item, 'ille piscis' vel 'hic piscis non est fœtum enitens, sed ova pariens;' videlicet ex iis qui fœtum enituntur, ergo aliquis piscis ex iis qui fœtum enituntur, sed ova non pariunt, non est ille, vel non est hic piscis. 'Thales est *unus* ex septem sapientibus,' id est *aliquis* ex septem, ergo 'aliquis ex septem Thales.' 'Pythagoras non fuit e septem sapientibus,' id est *ullus* e septem, ergo 'ullus e septem non fuit Pythagoras.'"—*De Dialectica*, fol. 37.

Valla has here manifestly penetrated into the true nature of conversion. His doctrine, in effect, is, that by explicating the proposition, the conversion is, in any case, a simple turning of the sentence. Thus, for example, when we say, "all man is animal," what do we mean? Obviously, that all man is *some* animal, or *a species* of animal, or *a certain species* of animal; therefore, "a certain species of animal is all man." In other words, that though the predicate notion is in general, absolutely considered, of wider extent than the subject notion, yet that when considered relatively in a proposition, its extent is always restricted to that of the notion with which it is connected; so that by expressing this restriction, that is, by explicating the proposition, the subject and predicate are always convertible terms, and thus all conversion is necessarily *simple*. He accomplishes this, it will be seen, by explicitly quantifying the predicate; as, no man is a satyr—that is, *any satyr*. He has, however, blundered in the example. He should have given *ullus* for *nullus*, or *est* for *non est*.

We pass on, however, to his more explicit judgment in this matter. In the third book of his Treatise, Valla considers the right of the predicate to the marks of quantification in a brief chapter devoted expressly to this subject. It is headed, "*Dum signum applicatur prædicato, dumque abest a toto syllogismo signum,*" and is as follows:—"Hactenus locuti sumus cum signum universale applicatur *subjecto:* quid cum applicatur *prædicato?* Certe pari ratione; quæ exempla breviter subnectam, 'Tu amas *omnes* tuos cives, hi autem *omnes* sunt cives tui, ergo, tu amas hos *omnes.*' Hoc universaliter; particulariter vero si assumas, 'hic est civis tuus,' concludasque 'ergo, tu amas *hunc;*' sive diverso exemplo, 'Deus est ubique,' id est in *omni loco*, 'Tartarus est locus, ergo Deus est in Tartaro.' Hoc affirmative; negative sic, 'tu nullum civem tuum, sive nullos cives tuos amas, hi omnes sunt cives tui, ergo *neminem* vel *nullum* horum amas.' Item, 'in nullo loco scelerato est Deus, Tartarus talis est, ergo non est in eo Deus.' Exempla quæ attuli per signa universalia, si tollamus signa, *eandem vim* habebunt redacta ad infinita, ut superiore libro probavi; ut, Deus non est in loco scelerato, sive in locis sceleratis, *subauditur* enim *ullo*, sive *ullis;* tu non amas cives tuos, *subintelligitur omnes.* Idem fit in superioribus exemplis, ac cæteris omnibus."—Cap. xlvii. fol. 62.

Here the quantification of the predicate is explicitly allowed; and though the examples given of its lawfulness be incorrect, the rules of the common doctrine are falsified. For these examples are *affirmative* syllogisms of the *second* figure, contrary to the law that all valid reasonings in that figure must be *negative.* It is also further shown in this chapter that the quantity of the predicate is invariably a *determinate* one, and that when not so expressed, it is nevertheless always understood.

Valla here accordingly allows the quantification in theory, elsewhere he follows it in practice. Besides the examples given above, I remember two other passages in which he does this.

The first is, when speaking of *subcontraries*, he employs the

express quantification to prove that these cannot both be false. The passage is as follows :—

" Quocirca propria et pene sola subcontrarietas est in pronominibus ac propriis nominibus, nunquam (ut dixi) utraque parte vera. Quo magis illorum confutatur opinio, quibus placuit duas aliquando subcontrarias simul esse falsas, *ubi eorum prædicatis adest signum universale ;* ut ' Plato est *omne* animal,' ' Plato est *nullum* animal.' Neque enim sunt veræ subcontrariæ quarum secunda non negat quod prior affirmat. Habet itaque illa affirmativa, ' Plato est omne animal,' suam negativam, ' Plato non est omne animal;' et hæc negativa suam affirmativam, 'Plato est *aliquod* animal,' quia *ullum* dicere non possumus."—Cap. xxxv. fol. 48. The whole passage is longer, and the quantified predicate is used in illustration of the same point to the end of the chapter; but the above extract may suffice to illustrate this use.

The second passage is contained in a brief but important chapter, headed, " *Syllogismi per totum et partem.*" The two last sentences contain the specific examples, but the whole chapter is well worth quoting, and the more so, since in some of the earlier examples also the predicate is quantified. It is as follows :—

" Similis ratio in* toto et parte, quæ in genere et specie ; quæ

* Valla seems somewhat strangely to employ the terms *whole* and *part*, exclusively in relation to *physical wholes and parts*. In this chapter, accordingly, under the general head of whole and part, he confines his attention entirely to these, without making any reference to the wholes and parts which had been commonly discriminated as *logical* and *metaphysical*. To the *logical* or *extensive* whole, indeed, no express reference was necessary, since all ordinary syllogistic reasonings (his own amongst the rest) proceeded in this quantity, it being the only one formally recognised in the science. To the metaphysical whole he himself refers elsewhere. In a previous chapter, devoted to the consideration of the *order of the syllogistic parts*, he gives an example of a reasoning in the metaphysical or comprehensive whole, and very sagaciously asks, why the syllogism does not proceed in this order, from the individual or species to the genus—from the narrower to the wider notion? " What is the reason," says he, " that we may not construct a syllogism thus—' Socrates is man ; but all man is

exempla brevissime subjungam. Prima forma erit hæc, 'Tota Italia est in Europa; tota Campania est in Italia; ergo tota Campania est in Europa.' Altera quæ hujus particularis est, hæc erit, 'Tota Campania est in Italia; Neapolis est *pars* Campaniæ; ergo est in Italia.' Tertia, negativa, hæc, 'nihil Italiæ est in Asia; tota Campania est in Italia; ergo nihil Campaniæ est in Asia.' Quarta quæ hujus particularis est, hæc, 'Nihil Ægypti est in Africa; Alexandria est *aliquid* Ægypti; sive *pars* sive *pars quædam* Ægypti; ergo non est in Africa.' Nam 'nihil,' idem est quod 'non aliquid,' sive 'non quiddam,' id est non ulla res, sive non quædam res, quemadmodum superius docui; sicut 'omne' et 'omnia' substantivum, id est omnis vel omnes res.

"Quando *adest prædicato signum*, hæc quoque sint exempla; '*totum* corpus anima nutrit; toti ungues sunt *pars* corporis; ergo *totos* ungues anima nutrit.' Vel assumendo particulariter, quæ est secunda forma; 'hic unguis est *pars* corporis; ergo *hunc* unguem anima nutrit.'

"Item negative: 'Nihil corporis anima negligit; toti ungues sunt *aliquid*, vel *pars* corporis, sive hic unguis est *aliquid*, vel *pars quædam* corporis; ergo nihil unguium, aut non hunc unguem anima negligit."—Cap. xlix. fol. 62.

It will be seen that in these last examples the rules of the common doctrine are again falsified; for they contain syllogisms of the second figure, some of which are affirmative, and others particular. The examples may, indeed, be objected to.

Such is the doctrine of Laurentius Valla on the point in question; and it will be seen from the extracts we have given, that he recognises (though appreciating very partially and imperfectly its significance) the express quantification of the predicate.

animal, therefore Socrates is animal;' ascending as it were by certain steps, Socrates the individual, man the species, animal the genus?" This was in effect asking, though he himself probably did not see the full meaning of his own question, why the syllogism in logic did not proceed in the whole of *comprehension* as well as in that of *extension*; a wise question, which was not replied to, by subsequent logicians, and remains still unanswered.

The two next witnesses whose evidence I have to quote in favour of a quantified predicate, have this much in common—that they were contemporaries—were both men of great learning and ability—both acute writers on logic—both well and widely known in their own day, and that their names and works have long since passed into utter forgetfulness. It may, I believe, be added, that I am the first in modern times to have directed any attention to their writings;—they are Jodocus T. Isenach of Erfurt, and Ambrosius Leo of Venice. Of these we shall take the latter first, since, as a fellow-countryman, his evidence will naturally enough follow that of Laurentius Valla.

Ambrosius Leo* was a physician at Venice, and flourished

* Ambrosius Leo, called from Nola the place of his birth *Nolanus*, was one of that noble band of men, distinguished for varied genius and scholarship, whose labours towards the close of the fifteenth, and commencement of the sixteenth centuries, conferred on Venice a name of imperishable renown. He was, as stated in the text, for many years a physician in that city, but like several of his craft at that time, was not only skilled in medicine as a physician, but also profound as a philosopher, erudite as a scholar, and accomplished in all worthy and noble arts as a gentleman. His very name, however, seems to have been long since forgotten, and his works to have passed into complete oblivion. For a time, indeed, these seem to have been kept in some remembrance, since they appear in some of the older catalogues of distinguished works and authors. Thus, Simler, in his epitome of the Bibliotheca of Conrad Gesner, says, "*Ambrosius Leo* Nolanus scripsit opus quæstionum, tum aliis plerisque in rebus cognoscendis, tum maxime in philosophia et medicinæ scientia. Impressum Venetiis 1523. Idem edidit Castigationes in Averroem, qui liber magnus est, ac totius philosophiæ thesaurus. Sunt enim quasi commentarii quidam, ordine in singulos Aristotelis libros. Excusæ Venetiis 1517. Actuarii Johannis Zachariæ filii de urinis libros septem, ex Græcis Latinos fecit. Impressi Basileæ apud Cratandrum 1528."—(*Epitome Bibliothecæ Conradi Gesneri per Josiam Simlerum. Tiguri* 1555.)

And Vossius adds to this comment the following:—"Anno 1517, ac deinceps, non exiguæ eruditionis laudem reportavit Ambrosius Leo Nolanus, vir Latine Græceque doctissimus, philosophus idem, ac medicus insignis. Hic præter ea, quæ a Simlero memorantur, reliquit libros tres de Nola non incuriosè perscriptos: quorum sæpius meminit Leander Albertus in descriptione Italiæ: imprimis quo loco agit de Nola."—(*De Hist. Lat.* L. iii. c. xii.)

He appears to have soon lost even such distinction as this, for his name

during the latter part of the fifteenth and the beginning of the sixteenth century. He was the author of several smaller treatises, but his greatest production is a work against Averroes,

does not appear in any of the later catalogues of a similar kind which I have been able to examine. Indeed, for some time after having obtained his work against Averroes, I could not find out who or what he was. At length, however, I discovered that he was a friend of Erasmus, the latter having become known to Leo during his stay in Venice, and having afterwards corresponded with him. In the Epistles of Erasmus, accordingly, there are a few scattered references to Ambrosius Leo, and to this source I am mainly indebted for the few particulars of his history with which I am acquainted.

The first mention of Leo which we meet with in the Epistles, is in a letter written to Erasmus by John Watson, and dated from Cambridge in the month of August 1515. Speaking of a recent visit to Venice, Watson says, "I conversed almost daily with the physician Ambrosius Leo in the apothecary's shop at the sign of the Coral. I remembered him from what you had said of him, in connexion with the proverb, δὶς διὰ πασῶν. He did many things for me, for your sake." The reference here is to the "Adagia" of Erasmus, who, in his commentary on the proverb quoted above, refers to Ambrosius Leo in the following manner:—"Etenim cum hæc meis illinirem commentariis, forte fortuna supervenit Ambrosius. Leo Nolanus philosophus hujus tempestatis eximius, et in pervestigandis disciplinarum mysteriis incredibili quadam diligentia solertiaque præditus; neque vero mediocriter exercitatus evolvendis et excutiendis utriusque linguæ scriptoribus." —(*Adagia Erasmi*, in h. l.)

In the summer of the year 1518, Leo himself writes to Erasmus, and after referring to a small work which he had written on the history of his native town and district, Nola, and to other labours in which he had been engaged, tells him that he has completed a great work, divided into forty-six books, peripatetic in doctrine, and written against Averroes. Erasmus writes a long and very interesting letter in reply, almost a twelvemonth afterwards, in which he calls to remembrance the pleasant intercourse he had had with Leo and his brother scholars at Venice, and congratulates him upon the happy fortune which had cast his lot among the most learned scholars and in the first city of the world:—"Quo minus expectatæ venerunt tuæ literæ, *Ambrosi* doctissime, hoc mihi plus voluptatis attulerunt. Sic enim mihi totam illam nostræ consuetudinis memoriam renovarunt, ut eas legens apud *Venetos* mihi viderer agere, veteres amicos meos tueri coram et amplecti, *Aldum*, *Baptistam Egnatium*, *Hieronymum Aleandrum*, *M. Musurum*, te cum primis amicorum omnium suavissimum. Agnosco lepidissimos tuos mores in epistola tua, quæ tota jocis ac salibus scatet. O te felicem, cui contigerit in pulcherrimis studiis, et in urbe facile omnium magnificentissima, inter patricios et eruditos viros consenescere!"

entitled "*Ambrosii Nolani Castigationes, adversus Averroem.*" This was first published at Venice in the year 1517, and again at the same place in 1532. The first part of the work is occu-

He afterwards expresses his earnest wish that the book against Averroes were published.

We hear no more of Leo in the Epistles till the year 1528, in which year he seems to have died, for in the month of October in that year, Erasmus writing to a friend, says:—"*Ambrosium Nolanum* nobis ac studiis ereptum doleo, sed quandoquidem omnibus semel est moriendum, ille nec vixit incommode multos annos, nec infeliciter mortuus est."—(*Opera omnia Erasmi. Ed. Clerici.* Lugd. Vol. iii., pp. 161, 334, 506, 594.)

The most considerable of the works of Ambrosius Leo, both in value and extent, is evidently this one against Averroes. It is a large folio volume, containing upwards of 1100 pages; and comprises within itself, as Simler says, a perfect storehouse of philosophy. He follows Averroes pertinaciously into almost all subjects, and seems equally at home in logical, mathematical, physical, or metaphysical discussions. I speak, of course, only from a limited knowledge of the work, having only consulted it in relation to particular subjects in which I felt specially interested; but the acuteness and knowledge it displays seem equally balanced and both great. The reading of Leo, indeed, appears to have been not only very extensive, but critical and exact; he is critically read (as were all the learned men of his time) in ancient Greek philosophy; and what was a less common accomplishment, seems also quite familiar with all the later Greek and Latin commentators. The wide reading and varied sagacity which it displays, as well as the size of the work itself, are quite sufficient to explain the declaration he playfully makes in writing to Erasmus, that he did not waste away his nights in bed.

This volume is, as I have said, now of the greatest rarity. The biographers of Averroes, as far as I can find, are ignorant of its existence. The ordinary bibliographers make no reference to it. It is not, so far as I can ascertain, in any of the public libraries of the country. And what, perhaps, is a stronger proof of its rarity than anything else, and proves it to be as little known on the continent as in this country, is the fact, that a man so curiously and widely read as Morhof, should not only never have seen it, but expresses his belief that it was never published. In his *Polyhistor*, Morhof, while referring to the notices in the letters of Erasmus that such a work was in preparation, says, at the same time, that he does not believe that it was ever really published.

In abatement, however, of the statement, as to the utter oblivion into which the name of Ambrosius Leo has fallen, I should say that it is still remembered in connexion with his small work on the history of Nola, which is not very rare, and is still, I see, referred to in connexion with the history of the Italian states.

pied with a detailed criticism of the commentary of Averroes on the Organon; and in this he examines, among other statements, what Averroes says on the passage in the book touching enunciation relative to the quantification of the predicate. We have already given the passage from Averroes. Leo joins issue with him on this statement; he takes the case which is also taken by Averroes, but not referred to by Aristotle,—that in which the predicate is quantified particularly,—and he defends against Averroes the validity and usefulness of such quantification. The passage in which he does this is a somewhat long one; but as the rarity of the work is such as to preclude anything like general reference, it may be worth while to give it entire. It ought to be premised, however, that the text is in such a state, partly through carelessness in printing, partly through excessive and strange contraction, that the making it out, in many cases, is a kind of divination. It is as follows:—

"Aliud est non recipere *rem*, et aliud non recipere *divisionem rei;* ut aliud est non recipere esse genus, id quod dicimus pedestre, et aliud non recipere divisionem pedestris in bipes et multipes; unde Aristoteles genera facillime recipit, divisiones vero eorum facile non recipit. Non igitur, si enunciationes quæ in prædicato habent clausuram non dividuntur, etiam non recipiuntur, nam existere possunt etiam sine divisione; sed potius si non recipiuntur, non etiam dividuntur: quamobrem Aristoteles monet non esse recipiendas, non autem non esse dividendas. Idema ptius in primo Priorum docuit. 'Ut similiter,' inquit, 'eligendum, et quæ ipsum sequitur tota, per eandem causam; ipsum autem quod sequitur, non esse sumendum totum sequi. Dico autem, ut *in homine esse omne animal*, aut *in musica omnem disciplinam;* sed tamen simpliciter sequi, quemadmodum antea monuimus. Etenim inutile alterum et impossibile, ut *omnem hominem esse omne animal*, vel *omnem justitiam omne bonum;* sed cui alterum consequens est, in illo *omne* dicitur.' Hæc ille. Quare ab arte repelluntur tales propositiones ut ineptæ et malæ; non

autem non numerantur, vel dividuntur, propter eas causas: nam hac via qua ivit Averroes, non excludere moneremur, quas excludere velle ars ipsa comperitur. Quinetiam ubi legisset Averroes hæc Aristotelis verba: ‘ Sed universale prædicatum universaliter prædicare, non est verum; nulla enim affirmatio vera erit, in qua prædicatum fuerit universaliter universale, ut, *est omnis homo omne animal:*’ vidissetque *nihil dictum esset ab Aristotele de nota particularitatis,* quonam modo se haberet, si etiam prædicato termino addita fuisset. Voluit eum locum, veluti mancum, exponendo perficere; dicens de *omni clausura,* ut si universalis clausura est addita prædicato, enunciatio erit falsa, si particularis, erit superflua. Aristoteles vero, neque *hic,* neque in loco *Priorum* prædicto, meminit particularitatis, atque superfluitatem eam non particulari tribuit, sed universali. Quare *duobus modis* videtur Averroes aberrasse. Tu vero si melius fueris interpretatus, videbis clarius aberrasse Averroem, nam hoc in loco Aristoteles exacte dixit. Namque si ejusmodi universalis cum prædicato quod *universaliter* prædicatur, est falsa semper, nullamque talem esse arti aptam, tenendum est. Quare, si universalis ea ejecta est, etiam ea universalis cum prædicato quod *particulariter prædicatur* ejicienda est, vel si vera sit? Non enim opponi potest illi, quod in arte ipsa non habet locum; præsertim quum in hoc loco omnis enunciatio considerata in oppositione collocatur. Quinetiam neque usquequaque nota *particularitatis* addita prædicato superflua est, neque falsam reddit enunciationem. Dicentes enim, *omnis substantia quoddam ens est,* vere dicimus; atque si determinamus ita dicentes, non etiam superflua erit ea additio. Dicentes enim *substantiam esse ens,* verum dicimus, non quia ipsum ens, usquequaque inest prædicato substantiæ, sed quia *pars* entis est, quæ de substantia prædicatur. Quod, ubi determinantes, significamus, non inepte facimus et superflue; monemus enim ita, ne per multa vagetur audientis animus. Quamobrem in more est Aristoteli uti hujusmodi genere loquendi, *cum ea nota addita prædicato.* Veluti

in primo De Moribus, 'Omnis ars,' inquit, 'et omnis doctrina atque actio, similiter et electio, bonum *quoddam* expetere videtur;' et in sexto, 'Divinæ hæ omnes,' inquit, 'unum *quoddam*, genusque *quodpiam* exceptum sumentes, de hoc, non de ente simpliciter, neque ut est ens, considerationes suas efficiunt.' Quamobrem et si nota *particularitatis* addita prædicato faciat enunciationem ineptam in oppositionibus; non usquequaque tamen inutilis est, atque idcirco Aristoteles *de ea nihil locutus est.* Nam quoad oppositionem, de ea determinatum est—non esse recipiendam; quo vero ad modum loquendi determinate—non esse rejiciendam putavit, *sed non rejiciens illam admisit.* Quod si de nota *universalitatis* addita prædicato, qua *superflua* est, locutus est in Prioribus Analyticis, hic vero *non* locutus est, nihil mirum est; hic enim, de oppositionibus enunciationum disputaturus, considerat eas enunciationes, quæ in eis clausuram (?) ponunt, quæ vero inesse non potest in oppositione, illa rejecta manet, *nec oportet amplius considerare et de rejecta,* an sit in ea *superfluitas.* In priore vero Priorum prohibetur *nota universalitatis in prædicato*, tum quia est impossibilis propositio, tum quia si esset vera, esset inutilis illi, qui facultatem quærit medii inveniendi; quippe quod ei satis sit, simpliciter prædicatum referre.—His ita se habentibus, patet male dixisse Averroem de nota *particularitatis*, addita prædicato, tum quia non semper est superflua, tum quia superfluitas quæ spectabat ad universaliter prædicatum, transtulit ad particulariter prædicatum."—(*Castigationes*, &c., *in lib. De Interp.*, fol. 46.)

This is, on the whole, the most elaborate and acute criticism on this passage from Aristotle which I have met with; and it quite triumphantly establishes against Averroes the particular quantification of the predicate. The way, too, in which Aristotle himself is made to uphold this view is somewhat ingenious:—that since, on the one hand, he does not reject it in theory, and on the other actually adopts it in practice, he must be held to have received and approved of the particular quantification of the predicate. Leo is very careful, while rejecting the inter-

pretation of Averroes, not to oppose Aristotle; and I am half disposed to think that he was led into the adoption and defence of this particular quantification, as much through a determination to oppose Averroes when this was possible, without directly contradicting Aristotle, as from any previous insight into the question. His opposition has, however, in this case, led him into the partial adoption of a truth, which few of the commentators on Aristotle have at all perceived, but which he has so far very well stated and defended.

Jodocus Isenach,* or Justus Jodocus of Eisenach, was pro-

* Justus Jodocus Trutvetter Isenach, or as he was more commonly styled, Dr. Jodocus Isenach, was one of those devoted adherents to the ancient system of things, who formed so numerous a class in Germany at the beginning of the sixteenth century. Monastic scholars they were, for the most part, who were hostile to the Reformation, because they discerned in it a reaction against scholasticism, rather than because it menaced the unity of the Catholic Church. In the seats of learning, in Germany in particular, indeed, the battle of the Reformation was fought rather on the ground of letters than on that of religion; and when a religious plea was ostensibly urged in defence by those in authority, it was generally only as a mask under which they could more effectually attack their opponents. By these men the true faith was identified with an ignorance of letters and a knowledge of scholasticism. Those, therefore, who sought to disparage the latter, and to introduce the former, were necessarily heretics, and were persecuted as such. The fierceness of this persecution, indeed, combined with the obstinacy of those in power in clinging to a system now obsolete, determined a crisis in the struggle for improvement which had long been gradually going on, and hastened the complete reformation which soon followed. They would admit no innovation whatever in the existing system of instruction; they resolved not to modify in any particular their philosophical faith or teaching; and by thus blindly refusing to give up anything, lost all. To this class, as we have said, Isenach belonged; and to this it is probably to be attributed that so few particulars can now be gleaned of his history. Hardly any amount of individual genius was sufficient to save a single one of the vanquished in that warfare, from the oblivion into which all speedily fell. To those who were interested in the revival of letters, and the general progress of the Reformation, it became almost a duty to forget the names and reject the works of the abettors of ignorance and barbarism. Amidst the general enthusiasm which the new life had inspired, few were sufficiently interested in those who had sought to crush it at its birth, to redeem their names from forgetfulness, or hand down any record of whatever virtues they possessed, to posterity.

fessor of theology and philosophy at Erfurt during the latter part of the fifteenth and beginning of the sixteenth century; and if the slender accounts which I have been able to obtain of him be correct, was afterwards called to teach in the new uni-

Accordingly, with the exception of the very few particulars mentioned in the text, no specific biographical account of Isenach is to be obtained from any of the ordinary sources of information. The particulars there given are obtained from the Zedlerian Lexicon, which being one of the older encyclopædias, devotes six lines to his memory;—that being, I believe, the longest biography of Isenach to be found.

I have obtained, however, if not some additional particulars of his history, at least some materials for forming an estimate of his character, from another source, viz., the Letters of Luther, which contain some interesting references to him. Isenach may indeed be said to have been specially connected with the Reformation in Germany, since Luther himself was first his pupil, and afterwards, I was about to say, his murderer, but I ought rather to say, the cause of his death. Many grave accusations have been brought at different times against Luther, but none that I am aware of have ever laid this particular crime to his charge. He was notorious, indeed, for the summary manner in which he dealt with his opponents; but it was still not exactly in this literal sense that he was in the habit of destroying them. He was known to be a mighty man—mighty in the practical power which force of will and fiery enthusiasm bestow—mighty in the Scriptures—mighty, for that matter, in bodily strength; but it was, nevertheless, of the former kind of force rather than of the latter that he was used to avail himself in controversy; so that there would seem no just ground on which to urge such a serious charge. It is one, however, to which Luther himself in part pleads guilty. How far he really was so must be judged of from the sequel.

Luther was, as we have said, the pupil of Isenach. He was placed under his care, as it would appear, by his parents, in the year 1498, and continued for four years to attend his teaching at Erfurt. The two first of these were occupied with grammar, rhetoric, and other elementary studies. The third was devoted to logic; but he does not seem to have displayed any particular aptitude for the detail of that science, as he certainly does not afterwards recall the time thus spent with any particular satisfaction. After leaving Erfurt, Luther seems still to have kept up some communication, more or less direct, with Isenach. In particular, he seems to have been very urgent with him on the subject of scholasticism. Directly, by personal converse and by letter, and indirectly through his friends, Luther laboured earnestly and incessantly to modify his views as to the value of dialectic in theological training, and to abate his zeal in the interest of scholasticism. He was often, indeed, carried away by the strength of his feelings on these subjects; and what was intended as remonstrance became downright and stern denunciation. It was hardly to be supposed that Isenach

versity of Wittemberg. If this were the case, he must have been a distinguished man, since none but the best men of the time were called to occupy posts in that university. That he really was so is confirmed by the manner in which he is referred

would be prepared to listen calmly to these denunciations of his favourite studies. He regarded them indeed with the greatest grief and indignation,—feelings which deepened in proportion as Luther's zeal increased, and were aggravated by the reflection, that this contemptuous rejection of what he held most valuable proceeded from one of his own pupils. This was indeed that "most unkindest cut of all," that went far to sever the thread of his earthly life: so that Luther, on hearing of his death, writes to a friend that he fears he is responsible for having hastened that event,—so grievously had Isenach taken to heart his rash and profane condemnation of the sacred writings of the schools; in short, that he had died of his (Luther's) contempt of scholasticism:—"Hac hora," says Luther, writing to Spalatin, December 1519, "ex socero Lucæ [Cranach] pictoris audivi, excessisse e vivis D. Doctorem Isenacensem Erfordiæ. Timeo et me causam acceleratæ suæ mortis fuisse; tantum ægritudinis fuit animo ejus ex meis, ut dicitur, profanitatibus et temeritatibus, quibus scholasticam theologiam doluit incredibiliter contemni. Dominus misereatur animæ illi. Amen." —(*Luther's Briefe, Ed. De Wette*, vol. i. p. 373.)

How far this was likely to have been the case will be better seen from the following extracts, which I translate from Luther's letters, on account of their interest as illustrating the character of Luther, of the times, and of Isenach.

The first extract is from a letter written in February 1616, to John Lange, Prior of the Augustinians at Erfurt, inclosing a letter which he had written to Isenach against the existing course of study. It is as follows:—

"I send you this my letter to the excellent D. Jodocus Isenach, full of discussions against logic, philosophy, and theology,—that is to say, of blasphemies and maledictions against Aristotle, Porphyry, and the Sententiaries —the accursed studies, to wit, of the age. For so it will be interpreted by those who have vowed, not for five years, as the Pythagoreans, but constantly and to all eternity, to keep silent as the dead—to believe all things —to be obedient listeners—and never, even in joke, to venture a skirmish, or to breathe the slightest word against Aristotle and the Sentences. For what will not be believed as truths by those who have such faith in Aristotle—who, himself the most calumnious of all calumniators, attributes to others things so absurd, that an ass or a stone could not possibly hold their peace at them?

"See to it, therefore, that you carefully deliver these to that same excellent man, and be sure to smell out what judgment he or any of the others may give concerning me in this matter, and let me know. For I desire nothing more earnestly than to unmask that actor who has so befooled the

to by Luther, who speaks of him as "*princeps* dialecticorum nostra ætate." Isenach was the author of several works on various branches of philosophy; his logical treatises are, however, two, a larger and a smaller one. The former was en-

Church with his Greek guise, and to make his shame manifest to all, had I only leisure.

"But the greatest sorrow to me is, that I am compelled to see so many of our brother monks, endowed with excellent genius for all worthy studies, waste their lives and lose their labour amidst such filth as this; nor do the universities cease to condemn and burn good books, while at the same time they dictate, or rather dream out bad ones.

"I wish that Magister Usingen, and Isenach to boot, would abstain, in fact, contain themselves, for a while from these labours. My repositories are all filled [with writings] against their publications, which I am convinced are worse than useless; and all others would think as I do, were they not (as I have said) laid under an obligation of silence."—(Pp. 15, 16.)

The second extract is from a letter written in May 1518 to Spalatin, in which Luther gives him an account, after his return to Wittemberg, of the good reception which he met with from the Count Palatine at Heidelberg, and of his conferences with Isenach and Usingen. He says:—

"To the Erfurthians my theology is a dish of death in the pot—rewarmed; and Dr. Isenach made himself remarkable at Heidelberg, by prefixing to all my theses a black theta, [a mark of reprobation,] according also his written testimonial, that he considered me an ignoramus in logic, not to say divinity.

"I would have disputed likewise among them, [those of Erfurt, to wit, on his return from Heidelberg,] had not the Litany days* prevented. I had, however, a private conference with Doctor Isenach; and if I did nothing more, made him understand that he was unable to prove his own positions or to confute mine; nay, that their opinions, [or perhaps sentences, in which case the word will refer to those of Lombard,] were that beast which is said to devour itself. But the fable falls on deaf ears: they obstinately stick to their distinctions, confessing, howbeit, that these are established upon no authority, except what they call the dictate of natural reason, which in our eyes, who preach no other light than Christ Jesus—the true and only illumination—appears simply as a night of chaos.

"With Dr. Usingen I strove more than with any other (for he was my companion in the carriage) to persuade him of the truth. But I know not whether I made any way; I left him in thought and wonderment: so strong is prejudice when we have grown old in evil doctrines. But the minds of all the young were diametrically opposed to these veterans; and

* In the old universities there were certain holidays on which the prelections were put a stop to, and certain others on which not only the prelections, but also the academical disputations were intermitted. The days on which the Litany was used marked the latter.

titled, "*Summa Totius Logicæ*," and was printed at Erfurt in the year 1501. The latter, which seems to be an abridgment of the previous work, is entitled, "*Epitome seu Breviarium Dialecticæ.*" It is without any date, but was probably published not more

my hope is good, that as Christ passed to the Gentiles when rejected of the Jews, so now His true theology which these opinionative seniors repudiate, may be embraced by the young."—(Pp. 111, 112.)

The third extract is from another letter, written in the following month of the same year, to Spalatin, touching the value of dialectic in theological studies:—

"You ask, how far I think dialectic is useful to theology; verily I do not see how it can be other than poison to a true divine. Grant that it may perhaps be useful as a sport or exercise for youthful minds, still in sacred letters, where simple faith and Divine illumination are to be awaited, the whole matter of the syllogism is to be left below, even as Abraham, when about to sacrifice, left the youths with the asses. And this, John Reuchlin, in the second book of his Cabbala, sufficiently confirms. For if any dialectic be necessary, that given by nature is enough, by which a man is led to compare one belief with another, and so to arrive at the truth. I have not unfrequently engaged in discussions with my friends as to the profit to be gained from this so sedulous study of philosophy and dialectic, and truly with one consent we have marvelled at, yea, bewailed over, the calamity of minds, finding in these studies no help, but rather a whole flood of hinderance.

"Finally, I have written to Doctor Isenach, the prince of dialecticians (as it seems) in this age, insisting most strongly on the same thing, which indeed cannot be denied, to wit, that dialectic cannot help theology, but rather hinders it, because the same grammatical terms are used in a widely different sense in theology and in logic. How, therefore, I say, can dialectic be of any use, when, after I enter on theology, the same term which in logic signified such a thing, I am compelled to reject, and to receive in another sense? And that I may not multiply words, take, for example, the following:—*Body*, in the tree of Porphyry, signifies a thing made up of *matter* and *form;* but such body cannot belong to man, seeing that in the Scriptures our body signifies *matter* only, not also *form*,—as where it is said, 'Fear not them which kill the body, but are not able to kill the soul.' Farther, I instance the absurd statement, that an angel is neither rational nor irrational; as also, that it is of no use to the Scriptures for a man to be called sensitive, rational, corporeal, animated; and briefly, the whole of that arrangement of the tree of Porphyry, I have said, and still say, is more trivial than an old woman's fancy or a sick man's dream, and justly, therefore, is it called Porphyrean, (that is bloody,) from the Christian souls, to wit, which it has slain.

"The good man took it much to heart, and affirmed that my sophisms

than a year or two after the former, since its press-work manifestly identifies it with the earliest productions of the sixteenth

could not be credited even by myself. But these worthies are the bondmen of Aristotle and Porphyry, and consider not *what* is said, but simply *who* says it. Hence it comes that they are not able to understand a single chapter of Scripture, much less to render it.

"If, therefore, you accept my judgment, dialectic, of whatever use it be in other things, in sacred letters only does harm. I myself have observed the doctrines and rules of the scholastic theology, and have designedly endeavoured to treat the inspired writings and those of the Fathers of the Church according to them; but (may God condemn me if I lie) I recoiled in horror from the confusion, worse than that of Tartarus, [which this treatment caused.] But I will make the same attempt on you when we meet, and shall then detail, what you now briefly hear."—(Pp. 127, 128.)

These extracts are very characteristic of Luther—of his honesty—his thorough out-spokenness—his utter want of sympathy with the ancient barbarism, and his fiery zeal for its destruction. When we remember, however, that such deliverances as these were addressed to a man of whose character and history the only remaining record is, that he was a "lover of the scholastic theology;" and remember also, that they came with the bitter aggravation of having been given by one who had enjoyed the best opportunities of knowing the worth of the things he despised, since he had heard their value expounded by the ablest lips—the case certainly assumes a very grave aspect; and one can hardly wonder that Luther should have felt some misgivings as to his innocence in the matter. On the somewhat extravagant hypothesis, that such a catastrophe was possible to the abettors of scholasticism, there is here amply enough to explain a broken heart; and certainly the mildest jury that ever was empannelled could not have acquitted Luther of manslaughter.

The works of Isenach are now altogether forgotten. This smaller one on logic is the only one that I have ever seen. My copy is quite perfect, but contains no date, printer's name, or place of printing, nor has it catchwords or paging of any kind. Its title is curious, and (except the punctuation) is as follows:—

"Epitome seu Breviarium Dialecticæ, hoc est, disputatricis scientiæ. Iterum jam recusum; planiori siquidem, et præceptorum, et exemplorum filo.

"Per D[octorem] Judocum Issennachenum.

"Illitium Empturienti.

"Non sum, O Lector, Breviarium Romanum Moguntinum, aut id genus aliud, quo sacri Deo flamines supplicia fundunt; sed Logicæ, quo pueri prima ejus rudimenta haurire poterunt. Eme modo; non dices olim, quod Calcearius Romanus de Corvo suo,—Opera, et impensa periit."

Then follow a dozen of verses by Daripinus, Poet and Orator Laureate, which occupy the rest of the title-page.

century. This is the only work of Isenach's with which I am acquainted; but the general knowledge and acuteness which it displays, certainly go far to vindicate the justice of the title which Luther bestows upon him; and to prove that he was not only an accomplished logician, but what is far more rare, an independent thinker in the science. It proves clearly, among other things, that he was familiar with the use of a quantified predicate; but what precise value he attached to it, or how far he really employed it in the science, it is extremely difficult from the work to determine. This difficulty arises mainly from the circumstance, that this treatise being simply designed as an introductory one, the longer, more novel, and abstruse discussions are left out of it, and we are referred for them to the larger work. This is the case with those which relate to the quantification of the predicate. When we come fairly upon the subject, and hope to have it fully discussed, we are disappointed in this, and get instead a quiet reference to the *opus majus*, which to those who only possess the *opus minus*, and have no access to the other, is provoking enough. Quite sufficient, however, remains in this smaller work* to establish the fact,

* This work, though relatively less, is not absolutely small. It is a quarto volume of some thickness, printed very closely, in the most contracted style of the most contracting era of black-letter printing. In this respect it is sometimes worse even than the work of Leo, three letters being often deemed amply sufficient for a word of three syllables, and sometimes for one of four. The text is, indeed, a perfect forest of large black-letter contractions, overrun with a tangled underwood of smaller black-letter contractions in the shape of notes, and intersected continually with tables designed to render clearer, and sometimes to supersede the divisions of the text, but which, owing to the ingenious interpenetration and general confusion of their bracketting, are in themselves a new and independent source of perplexity and bewilderment. This being the case, I will not undertake to say that I am familiar in detail with every part of the work. I have looked through the whole, read some parts carefully, and marked the passages which seemed specially to bear upon the subject in hand. It is more than probable, however, that some point of interest may have found its way into some of those labyrinths of note or table which I have not yet perfectly explored. The extracts here given illustrate clearly enough, however, the

that he was familiar with the quantification of the predicate, and that he employs it to some extent in the science. I shall accordingly extract from various parts of his work some of the passages which go to show this. These passages will necessarily be given out of their own connexion; and as I shall often be obliged to forego the comment they tempt, in order that this note may not be unduly extended, they will often be found to have no other relation to each other than their common reference to the principle in question. I shall first give some extracts from Isenach's exposition of *terms* and their *signs*, then from what he says of *propositions* and their *relations*, and finally select one or two passages from his comments on the *special rules of syllogism*.

In relation to *terms* he adopts the common division of *Categorematic*, and *Syncategorematic*,—the former including the subject and predicate of a proposition—the latter the various affections or modifications of these. On this second division he has the following passage, which I quote, both on account of its own precision, and for the sake of what is to follow:—

"Sincathegorema, quod per se et solitarie non est significativum alicujus rei vere vel imaginarie, sed junctum termino significativo et cathegorematico variat modum concipiendo rem significatam per ipsum, quod denotat ipsum accipi pro suo significato vel significatis aliquo more; puta universaliter, particulariter, singulariter, et cum iis; ut omnis, aliquis, iste, non. Nam dicendo *omnis*, nullam rem concipio vel intelligo; sed dicendo *omnis homo*, concipio vel intelligo hominem non simpliciter, sed universaliter *omnem*. Ita quoque dicendo *iste*, nihil addendo vel subintelligendo, nullam rem intelligo; sed quum dicitur *iste homo*, intelligo singulariter *hunc hominem* demonstra-

point in question, and are sufficient for the present purpose. I have some hope of being able to obtain the larger work of Isenach; and should it prove of sufficient interest, will hereafter give a fuller account of his doctrine.

tum. Idcirco dicuntur hujusmodi signa nihil significare sed duntaxat *con*significare. Unde nec grammatice, se solis possunt reddere suppositum verbo; nec logice, esse extrema propositionis, sed solum *determinationes* et *modificationes eorundem*. Et quia hujusmodi signa, ratione considerationis et habitudinis, (puta, universalitationis, particularisationis, singularisationis, distributionis, confusionis, et cum iis,) quam important circa terminos sibi additos, mutant sensa propositionis et sæpius veritatem vel falsitatem, idcirco logicus perquirit de ipsis hujusmodi passiones."

This passage will serve to show his just appreciation of the value of modifying marks as affixed to terms in restricting or extending, or in general in rendering definite their meaning. A little further on he says very significantly in relation to these :—

" Illud vero quod ad copulam principalem est suppositum, quocunque loco ponatur, est subjectum propositionis cum omni quod ipsum determinat, dempto sincathegoremate, sumpto irrestricte sive non restricte; ut ' caput canis pilis intextum habet homo decrepitæ ætatis:' ubi verbum '*habet*' pro suo formali significato est copula, et idem pro suo materiali significato cum hoc toto, '*caput canis pilis intextum*,' quod ipsum determinat, est prædicatum; subjectum vero est hoc totum, '*homo decrepitæ ætatis*.' Simili modo judicandum est de illis : ' homo omni animali principatur;' ' degeneres animos timor arguit;' ' velocibus alis mors volat;' ' ignis et aer sunt elementa calida.' Additur, dempto sincathegoremate sumpto irrestricte, *quum illud usu communi logicorum non est pars subjecti vel prædicati*. Sincathegorema autem sumi restrictive vel non restrictive stat in arbitrio utentis. Fateor tamen, quod usu communi logicorum tunc sumitur restrictive quum ponitur a parte prædicati; (ut ' Adam fuit *omnis homo*,') vel inter partes subjecti diversorum casuum, et determinat obliquum (ut ' conservans *omnem creaturam* est Deus.') Irrestrictive vero sive non restrictive frequenter sumitur quum

ponitur in principio propositionis secundum veram constructionem; ut 'omnis lapis est durus;' 'caput habet omnis homo;' 'verba dat omnis amans.'

"Scias tamen, quod sensus orationis variatur quum sumitur restricte et irrestricte, verbi gratia, 'omnis homo est animal:'—

"Sumendo signum 'omnis.'

Restrictive valet; 'aliquod existens, omnis homo est animal;' sic est falsa, quia nihil est dabile quod sit omnis homo.

Irrestricte valet; 'quicquid est homo est animal:' vel sic, 'de quocunque verum est dicere quod sit homo, de eodem verum est dicere quod sit animal;' sic est vera."

I give a single extract from a long chapter on *signs*, (in which Isenach often employs propositions with their predicates quantified,) mainly to illustrate his use of the terms *determinate* and *confused*. At first, from his casual use of these terms in other places, I thought that by the former he meant a term with a mark of quantity, and by the latter one without such mark; but it appears from his exposition and illustration that he simply means by *confused* a universal subject, and by *determinate* a particular or individual subject. The following is the passage:—

"*Confuse:* ita quod alterum extremorum denotatur ipsi convenire pro aliquo omnium suorum significatorum, hoc vel illo, et nullo certo vel determinato; ut 'omnis homo habet caput,' ubi denotatur quemlibet hominem habere caput, nec omnes aut plures, unum, sed quemque suum. Et hic dicitur supponere communiter, confuse, tamen disjunctim sive non collective.

"*Determinate:* ita quod alterum extremorum denotatur ipsi convenire, inter omnia sua significata, pro aliquo certo et determinato, vel aliquibus certis et determinatis; ut, '*caput habet omnis homo*;' ubi denotatur esse aliquid certum et determinatum

caput quod quilibet homo habeat. Hic dicitur supponere determinate." To illustrate this by an example which is given a little below:—" 'Omnis homo non est omne animal,' ubi animal supponit confuse tantum: 'Anna non est omnis mulier,' ubi *mulier* supponit determinate."

We pass to the consideration of *propositions*. Isenach's view of the logical relation of a proposition is singularly just; and his exposition of its scientific capabilities and significance is at once comprehensive and exact. He explains in detail, that the matter of a proposition is its terms, and that its true logical significance ever lies in the affections of these, and the manner in which they are connected with each other. He divides the affections of propositions into those which belong to them considered in themselves, and those which arise out of their relation to each other. The former are of course *quality* and *quantity*. It is with the last member of this division alone that we are now concerned. In relation to it Isenach first gives the common doctrine, with its four-fold division founded exclusively on the quantity of the subject. He endeavours to explain the principle of his one-sided division, by saying, that the subject was selected as being the more important part of the matter of a proposition:—" Quantitas propositionis, hoc modo sumpta, penes subjectum principale, vel partem principaliorem subjecti, dicitur quantitas propositionalis; et ab ea propositio simpliciter denominatur aliqua denominatione ex jam dictis. Vocatur autem hoc nomine propter hoc, quia subjectum est prima et principalis pars materialis propositionis, atque principale fundamentum prædicationis, de quo cetera enunciantur."

He then gives a statement of his own, as a supplement to the common doctrine, founded on a far wider and juster consideration of terminal quantity. He asserts in effect, that the affection of quantity belongs to the *whole* matter of a proposition, and not to *one of its parts alone*, as hitherto exclusively considered; and that whether it fall on the subject or the predi-

cate it is equally of logical account. His statement is as follows:—

"*De quantitate terminali:* Solet etiam nonnunquam sumi quantitas propositionis penes quamquam partem materialem propositionis, (*i.e.*, *quemlibet terminum cathegorematicum,*) non curando quocunque loco ponatur. In hunc modum:—

"Omnis propositio in qua ponitur (quocunque etiam loco) terminus cathegorematicus

1. *Singularis*, est universalis: ut 'ille asinus istius hominis est tardigradus.'
2. *Communis*
   - *Distributus*, est universalis: ut 'oculus cujusque hominis est aqueus;' 'iste Deus est *omnis* Deus.'
   - *Acceptus determinate*, proprie est particularis: ut, 'hominis alter oculus est dexter.'
   - *Acceptus confuse* tantum, vel determinate reductive, est indefinita: ut 'Petrus est musicus.'"

He then goes on to make the following somewhat curious statement:—

"Hoc modo una propositio potest esse universalis, particularis, indefinita, et singularis; ut patet de illa: 'alter oculus est cujusque hominis (vel istius hominis) dexter oculus.' Hæc quantitas vocatur terminalis, et ab ea non denominatur propositio quanta *simpliciter*, sed cum addito; ut dicta propcsitio non denominatur simpliciter *universalis*, sed ratione illius termini hominis; nec denominatur simpliciter *particularis*, sed ratione illius terminus oculus; simpliciter vero denominatur *indefinita*, quia subjectum accipitur determinate reductive."

This he proceeds to apply to modal propositions, whose peculiarity, indeed, is logically considered, in the last resort, but an affection of the predicate.

The affections which belong to propositions considered in

their relation to each other are three—*opposition*, *equipollence*, and *conversion*. We shall extract without comment one or two sentences from what is said touching the first and last of these, and then pass on to the Syllogism. The following passages are from his discussions—the one of subalternate, the other of subcontrary opposition:—

"Terminus qui in subalternante stat confuse tantum respectu termini distributi in subalternata, non stet determinate respectu ejusdem termini distributi, sed accipiatur confuse tantum.... 'Omni tempore risibile est *omnis* homo;' 'aliquo tempore risibile est *omnis* homo.' Sed subalterna prioris est; 'aliquo tempore a risibile est omnis homo,' posito quod ly *a* faciat terminum risibile stare confuse tantum; vel illa, 'aliquo tempore omnis homo est risibilis;' vel ista, 'aliquo tempore risibile est homo.'...

"Si in una subcontrariarum ponitur aliqua universalitas, in altera omnia debent particularisari. Quare hoc non sunt subcontrariæ; 'aliquo tempore risibile est omnis homo;' 'aliquo tempore nullum risibile est omnis homo;' sed subcontraria prioris est, 'aliquo tempore risibile non est omnis homo.'"

The last sentence on this subject is the following, which is at once significant and disappointing:—

"Oppositio non solum sumenda est penes quantitatem propositionalem, sumptam penes subjectum propositionis seu principaliorem ejus partem; *sed penes quantitatem terminalem, quæ attenditur penes quamque partem materialem propositionis.* Potest itaque sumi oppositio, ex parte subjectorum, *prædicatorum*, et determinationum tam subjecti quam prædicati, atque etiam copularum. *Hoc est quod aliter dicitur.*"

The following is from his exposition of conversion:—

"Quod secunda, sive convertens, sequatur ad conversam, in bona consequentia, sic quod conversa non possit esse vera sine convertente: et propter hoc nihil debet universalisari in convertente quod non fuit universalisatum in conversa; nec terminus stans in conversa confuse tantum respectu termini distributi debet in

convertente stare determinate respectu ejusdem termini distributi, sed stet confuse tantum; vel terminus distributus in conversa non distribuatur in convertente. Cujus ratio est, quia in omni consequentia bona oportet caveri, ne arguatur a non distributo ad distributum, vel a termino stante confuse tantum ad eundem stantem determinate respectu ejusdem termini distributi.

"Propter defectum

Primi, non valet hæc conversio:

1. Omnis homo est animal; ergo, omne animal est homo; sed sic convertatur; quoddam animal est homo.
2. Nullus homo est *omne* animal; ergo, nullum animal est homo; sed sic convertatur; quoddam animal non est *omnis* homo.
3. Aliquod animal non est homo; ergo, homo non est animal; sed sic convertatur; quidam homo animal non est.

Secundi, non valet hæc conversio:

1. Cujuslibet hominis oculus est dexter; ergo, dexter oculus est oculus cujuslibet hominis; sed sic convertatur; ergo, dexter oculus est oculus alicujus hominis; vel sic, dexter oculus est cujuslibet hominis oculus.
2. Omni tempore risibile est *omnis* homo; ergo, homo est risibile omni tempore; sed sic convertatur; ergo, homo est omni tempore risibile, vel sic; ergo, homo est risibilis aliquo tempore.

" Volens itaque convertere aliquam propositionem, consideret diligenter, quæ sint ejus extrema, (puta subjectum et prædicatum,) atque habitudines logicas eorundem, (puta, suppositionem in genere, ampliationem, restrictionem, &c.,) *quas circa extrema exprimat, et subinde extrema transponat;* sic quod de subjecto fiat prædicatum ; et e diverso, constituendo aliam propositionem ejusdem qualitatis, in qua nihil universalisatur quod est particularisatum in priore, nec terminus aliquis stat determinate, respectu termini distributi, qui in priore, respectu ejusdem termini distributi, stabat confuse tantum. *Hæc enim conversio semper valet.*"

I quote the following passage mainly to show that Isenach saw clearly, what indeed he elsewhere more fully explains, that exclusive propositions distribute the predicate. It is the last passage in a chapter on exponibles :—

" ' *Tantum* homo est animal ' sic probatur: hoc prædicatum ' animal ' enunciatur de hoc subjecto ' homo,' et de *nullo alio ab eo*, (sive negatur ab omni alio,) et ita denotat per hoc signum *tantum.*—' Omnis homo est animal ' sic probatur : hoc prædicatum ' animal' universaliter verificatur de hoc subjecto ' homo,' (sive convenit subjecto pro omni supposito,) et ita denotatur per hoc signum *omnis;* ergo, &c. *De quo alibi latius diximus. Hæc pro rudimentis puerorum sufficiant.*"

It will be seen that both in this passage, and in the closing one treating of opposition, reference is disappointingly made for fuller discussion of the matter to the other work.

Isenach's discussion of the syllogism is, in every respect, the most important part of his book. He gives an acute preliminary exposition touching the general rules of inference, some of which, as partially relevant to the question in hand, I had designed to quote. His discussion of figure, too, is curious and interesting, especially his doctrine in relation to the fourth. These points of interest must, however, give way to those which more immediately refer to the question of the predicate. These

are the exceptions which he takes to the universal validity or necessity of the special rules of syllogism. He partially falsifies these by quantifying the predicate, as will be seen from the following passages:—

" 1. Ex puris affirmativis nihil sequitur formaliter in secunda figura.

" Cujus ratio est; quia contingeret medium in neutra premissarum distribui aut singularisari. Nam prædicatum non distribuit in affirmativis (saltem de *communi forma* propositionum, in quibus *non ponuntur signa pregnantia.*) Si vero hoc caveretur, valeret argumentatio; ut, ' omnis homo est *omne* animal;' ' omne risibile est animal;' ergo, ' omne risibile est homo.'

" 2. Secunda figura regulariter solum concludit negative.

" Nam, cum una premissarum debet regulariter esse negativa, oportet conclusionem esse negativam. Additur notanter, *regulariter*, quia, casu quo contingit *ambas premissas esse affirmativas*, sequitur etiam conclusio affirmativa ; *ut patet in priori exemplo.*

" 3. Minore existente negativa nihil sequitur formaliter, in prima et tertia figuris, directe concludendo.

" Quia contingeret argui a non distributo ad distributum. Nam, minore negativa, oportet majorem esse affirmativam, (quia ex puris negativis nihil sequitur,) et altera præmissarum negativa, oportet conclusionem esse negativam, et sic major extremitas, prædicatum majoris et conclusionis de communi forma propositionum, non distribueretur in majore sed in conclusione. Sed si hoc evitatur, (puta indirecte concludendo, vel quolibet aliter,) valet argumentatio; ut, ' omnis asinus est animal;' et

'nullus homo est asinus;' ergo, 'aliquod animal non est homo,' vel sic, 'nullus homo est *omne* animal.'

"4. Tertia figura regulariter solum concludit particulariter.

"Nam aliter contingeret argui a non distributo ad distributum ex parte minoris extremitatis. Hæc enim distribueretur in conclusione universali in qua subjicitur, et non in minore affirmativa in qua prædicatur: ut est cernere exemplo, 'omnis homo est animal; et, omnis homo est substantia; ergo, omnis substantia est animal.' Verum si illud cavetur, quomodocunque firma est argumentatio, ut hic: 'omnis lucidissimus planeta lucet; omnis lucidissimus planeta est *omnis* sol; ergo, omnis sol lucet.'

"5. Majore particulari, nihil sequitur formaliter et syllogistice, in prima et secunda figuris, directe concludendo.

"Cujus ratio est, quantum ad primam figuram, quia contingeret medium in neutra præmissarum distribui vel singularisari. Nam quum major sit particularis, medium quod in ea subjicitur, non distribuitur; et quum minor non posset esse negativa (ex superiori regula) in qua medium prædicatur, nec in illa distribuitur, de communi forma propositionum, uti hoc claret exemplo. 'Animal est asinus; et, omnis homo est animal; ergo, omnis homo est asinus.'" (Omitting his application of his rule to the second, I pass on to his refutation of it in relation to the first figure:) "Verum si hujusmodi *inconvenientia vitantur* (ut puta indirecte concludendo, vel quolibet aliter,) *valebunt argumentationes;* ut, 'lucidissimus planeta lucet; et, omnis sol est *omnis* lucidissimus planeta; ergo, sol lucet:' 'Animal currit; et omnis homo est *idem* animal; ergo, homo currit.'"

It is here clearly stated, that if the syllogism be taken in its regular form, as commonly considered, and as exclusively allowed by logicians, the rules are valid. The reason of this is

explained by showing what logical vice would be committed if they were violated; but it is quite truly added, that if we can avoid committing this vice in any other way than by obeying the rules, the syllogism is good, and the rules, therefore, no longer hold. This Isenach shows can be done by quantifying the predicate. He accordingly falsifies the two first rules by a syllogism of the following form :—

All A is all B.
All C is B. Therefore,
All C is A.

He partially falsifies the third rule by a syllogism in the following form, in which the predicate is not quantified in the premises, but in the conclusion :—

All B is A.
No C is B. Therefore,
Some A is not C. Or,
Not any C is all A.

The fourth rule is falsified by a syllogism in the following form :—

All B is A.
All B is all C. Therefore,
All C is A.

And finally, the last rule is falsified to its first division by one in the following form, which, except that it is less definite in quantity, is much the same as the preceding one :—

B is A.
All C is all B. Therefore,
C is A.

Such is a brief outline of the doctrine of Isenach in relation to the quantification of the predicate. It is clear, even from this imperfect account, that he was familiar with its use, and, to some extent, appreciated its value. I am disposed, however, to think that he was far more familiar with its somewhat indiscriminate use in practice than conversant with its true scientific

significance in principle. His insight into this does not appear to be great. Hence he often uses it capriciously, and without any particular end in view; and though, without doubt, he does occasionally employ it to simplify the working of the science, yet, after all, he does this very sparingly, and by no means to the extent we should expect from one apparently so familiar with its use. It is of course, however, as we have said, somewhat difficult to determine, upon such partial evidence, what precise value he did attach to the principle, since we are referred for this to discussions to which we have at present no access.

The last two writers whose names we have to quote in support of a quantified predicate are both much later than the preceding ones. We shall briefly quote from these the passages in which they partially allow in theory, or adopt in practice, such quantification.

The first is an Englishman, Joshua Oldfield, who, in his curiously discursive and ingenious "Essay towards the Improvement of Reason," which was published in London in the year 1707, touches, among other subjects, upon logic. Without professing to give anything in the shape of a regular system, he has some acute remarks on the syllogism, and among them the following, relative to the point in question:—

"The predicate of each enunciation is also supposed to be *universally* taken if denied, and *particularly*, when affirmed; so that in this latter case it ought to have a *note of universality added, if it be universally designed*, as it *may* be, in imagining a property, and *must* be, in giving a just definition, or a right description; for these ought to be made universal when the proposition is converted, and such predicate put in the place of the subject.

"Now, when the affirmed predicate is thus universally taken, the argument will certainly admit of being otherwise formed than according to the usual allowed *moods* or *modes*."—(P. 248.)

"Now, whereas it is commonly said, the enunciations must be

so and so, (as in the technical words before mentioned,) and that there can be no more concluding moods in such respective figures, it must be understood to be so upon the forementioned suppositions as to the *quantity of the predicate;* for otherwise, where this is universally affirmed, there may be, *e. g.*, such a mode as ITALI in the first figure; thus :—

I- Aliquod trilaterum est æquiangulum;
TA- Omne triangulum est (omne) trilaterum;
LI. Ergo, aliquod triangulum est æquiangulum.

In English, thus,—

I- Some three-sided figure has equal angles;
TA- Every triangle is any three-sided figure;
LI. Therefore, some triangle has equal angles."—(P. 250.)

These are the passages relative to the point in question which are to be found in Oldfield, who is the only English writer, so far as I know, by whom the quantification of the predicate is in any form allowed. It will be seen, however, from these extracts, how little he understood the principle which for the time he uses, since he even attributes to it none but a *material* cogency, and grants that the syllogisms commonly recognised by logicians are the only ones which are of formal, and thus of universal validity. It is also further manifest how limited was his view of its practical application; since, both in its statement and illustration, he confines his attention exclusively to the case of universal quantification, and this is considered only in relation to affirmative propositions which contain a definition or description.

The last instance to be adduced of the partial use of a quantified predicate is that of Godfrey Ploucquet. He lived during the greater part of the last century, was for many years Professor in the University of Tübingen, and published many small, but acute, and often original, treatises in connexion with logic and philosophy. The only work of his, however, with which I am acquainted is that entitled "Fundamenta Philosophiæ Specula-

tivæ," and published at Tübingen in the year 1759. In this work he employs the quantification of the predicate, in his treatment of propositions, to simplify their conversion. The following are the passages in which he does this, and they fully explain its use in his hands. I quote first, however, in order to render what follows intelligible, his own explanation of the peculiar symbols he employs :—

§ 34. "O præfixum denotat omnitudinem positive sumtam.
N præfixum denotat omnitudinem negative sumtam.
Q vel q. præfixa denotant particularitatem.

Duæ pluresve litteræ conjunctæ significant subjectum cum suis prædicatis. v. g. AB significat subjectum A cum prædicato B.

ABC significat subjectum A, cui inest prædicatum B, quod prædicatum B includit simul prædicatum C.

A—B denotat, A est B.

A > B denotat, A non est B.

N.A—B denotat, Nullum A est B.

A præfixum propositioni significat affirmationem universaliter sumtam.

I, affirmationem particulariter sumtam.

E, negationem universaliter sumtam.

O, negationem particulariter sumtam.

Cum seriei cuidam subjungitur signum, &c., denotatur series infinita, vel integra. Cum non subjungitur, denotatur series abrupta."

§ 36. "Sit primo, propositio universaliter affirmans, O.A—B. Hæc in generalibus et in symbolis spectata non infert hanc O.A est O.B sed O.A est q.B, § 24. Ubi vero notandum, quod particularitas nunquam intelligatur exclusiva."

§ 40. "Sit particulariter negans q.A > B.
Omne, quod est B, diversum est a quodam A. Ergo N.B est q.A.
Not. Operatio hæc vocari solet Conversio propositionum."

§ 41. "Apparet hinc, conversionem propositionum nihil aliud esse, quam transpositionem eorundem terminorum logice expressorum, nec quidquam in sensu ipso immutari. Si enim in sensu aliquid immutaretur, propositio non amplius esset hæc propositio. Ita nec ex particulari fit universale, nec ex universali fit particulare."

§ 43. "Sit propositio identica O.A—O.B: Hic A cum B identificatur, adeoque conversio fit O.B—O.A.

"Sint enim duæ series:

AB. AB. AB. &c.
CB. CB. CB. &c.

"Hic C non potest esse diversum ab A. Si enim B est idem cum A, tum B non potest inesse $\tau\tilde{\varphi}$ A & $\tau\tilde{\varphi}$ non - A, quia idem est idem.

"Cum usitatus loquendi modus non secum ferat hanc proponendi rationem: O.A est O.B, sed pro hac propositione substituatur O.A est B; convertendo dici potest q.B est A, modo attendatur ad id, quod particularitas comprehensiva et definita sit intelligenda, quæ justo modo extensa potest coincidere cum omnitudine. Si vero exacte loquendum sit, propositio O.A est B distingui debet ab hac O.A est O.B.

"Brevius: O.A est O.B. Si est O.B, præter B nihil aliud datur; adeoque O.B est O.A per conversionem.

"Vel sic: O.A est O.B; hoc est: Omne quod est in A tam ratione comprehensionis, quam extensionis, est quoque in B. A et B igitur nullo modo differunt, adeoque A est B, uti A est A."

§ 44. "Sit propositio particulariter affirmans q.A est B.

"Hic aut q.A est q.B, aut q.A est O.B.

"Priori casu patet, convertendo q.B fore q.A; posteriori autem, O.B esse q.A. Si enim quoddam A est quoddam B; patet ex hypothesi, nec ad omnia A, nec ad omnia B heic respici; adeoque seriem ita esse concipiendam

AB. AB. CB. CB. AD. AD. &c.

" Ex intuitione manifestum est, A et B non semper conjungi, sed tam A quam B cum diversis signis connecti. Ergo q.A — B idem est cum q.B — A.

" Posteriori casu autem sequens apparet facies

AB. AB. AB. &c.

AC. AD. AE. &c.

" Ex hypothesi non datur B, quod non insit τῷ A; adeoque, OB — A, sed tantum quoddam A est cum B conjunctum. *e.g.*, Quidam homo est miles. Non datur miles, de quo non prædicari possit, quod sit homo, adeoque omnis miles est homo, sed tantum idea *cujusdam* hominis connectitur cum idea militis. Sed cum in expressione consueta quantitas prædicati non determinetur; utraque propositio facta conversione habebit subjectum particulare."

It will be seen from these extracts that Ploucquet competently understood the use of a quantified predicate in relation to propositions. Strangely enough, however, he makes no use of it in his treatment of syllogisms, where especially, or rather exclusively, its higher scientific value rises into view. With the exception of two short sentences, (if I remember aright, for I speak only from past reading,) he gives no intimation of its use in relation to syllogisms. These sentences are both notes. The first, which is appended as an exceptional provision to the rule, that from two particular propositions nothing follows, is this:—" Hic tantum agitur de expressione conclusionis consueta, ubi prædicato non addi solet signum quantitativum." The second, which is given at the end of his consideration of the third figure, and is to the effect that valid negative syllogisms may be obtained in it, is as follows:—" Si in propositionibus particulariter negantibus adjiciatur prædicato signum particularitatis; figura hæc procedit in omnibus modis supra recensitis."

This want of anything like a scientific application of the principle to the syllogism may indeed be said to be universal.

None of those to whom we have referred as having partially appreciated it, seem to have been at all aware of its value in relation to the forms of reasoning; but, after having applied it to some particular detail in the treatment of propositions, or at most to some exceptional case of syllogism, appear to have abandoned it altogether.

The promised historical evidence touching the previous partial appreciations of the new doctrine properly terminates here. I cannot, however, close this note without quoting a curious passage from a recent British writer, whose contributions to logical science have not met with the attention which their merit deserves. This writer is Mr. Thynne, who would probably have become better known, but for the comparatively humble form which he has chosen as the vehicle of his logical discussions. These discussions were published in the form of notes to Walker's *Compendium of Logic*, which has been for many years, and, for anything I know to the contrary, still is, the text-book of Trinity College, Dublin. These notes evince a careful study of logic, and an acute comprehension of the science, both in its general scope and in its particular detail; they show also an amount of independent thought in relation to the science, very rarely indeed to be met with in recent logical writings. The paragraph I am about to quote is really a very curious one, on account of its strange prophetic significance. It is given as a note to a passage in the text, in which the author, after giving the common statement that there are in all 64 moods, and that so many are *in*valid, adds, "*accordingly there are* 19 *concluding moods*." The note is as follows:—

"(8) This, as logicians say, is gratuitously assumed. Sufficient has been said by our author to establish that all other modes than these 19 are inconclusive, but nothing has preceded to verify the conclusions in these modes. This may be done by the axioms, even more easily perhaps than by the

famous rules of Aristotle; but in the application of the axioms the distinction of the premises and extremes into major and minor vanishes. If *all men* and *some animals* agree with a third, they agree with *each* other; and it is indifferent whether it be understood that all men are certain animals, or certain animals are all mankind. And it is certain, that if syllogistic reasoning had been thus viewed and followed up, it would be more readily brought into practice, or rather—as it is already, in the general practice of reasoning, thus treated, imperceptibly because enthymematically—it would receive less distinction of mode and figure; and consequently require less rule, and admit of simpler and readier, although not more ingenious, complete, or elegant verification than as at present treated."

This prophetic foresight, however, exercises no beneficial influence on Mr. Thynne's own treatment of the science. Logic certainly receives no simplification at his hands; on the contrary, the whole subject of mood and figure is made, if possible, still more intricate by the ingenious involution and evolution of detail which Mr. Thynne has introduced into its treatment. He therefore does not accept the doctrine he foreshadows. He may be said indeed to have explicitly rejected the quantification of the predicate; for he has propounded a theory of his own in relation to quantification, which is, to say the least of it, of the strangest kind. Mr. Thynne holds that *quantification is an affection of the copula.* This is a confusion so strange and complete, that were it advanced by a less able author, it might be rejected at once. Anything, however, which is seriously urged by so careful a student of logic as Mr. Thynne proves himself to be, is entitled to consideration, and if found to be erroneous, merits at least the courtesy of a refutation.

Mr. Thynne adverts to his doctrine in several of his notes; but the passage in which he most clearly propounds it is the following:—

"Such marks of quantity, although grammatically qualifying

the subject, do in sense qualify the copula; intimating the extent in which the agreement or disagreement of the terms is declared—that this extent is implied to be, either general or partial. 'Every man is an animal' implies that 'man is universally an animal:' 'No man is a stone,' that 'man—is universally not—a stone:' and 'some men are just' that 'man—is in part of the extension—just.'"

On this I would remark generally, that even supposing it to be correct, and that we may thus explain the quantity of the subject, still no account is given of the quantity of the predicate, which on the same principle ought also to be an affection of the copula, and to be represented accordingly in the same manner. Thus, to take the last of the above examples, since this is the only one which is given in the regular form, Mr. Thynne having in effect quantified the predicate in the others by the articles, —this is, "some man is just," which, says Mr. Thynne, is truly expressed thus, "man—is in part of the extension—just;" but whether is this part of the extension of man equal to *all* just or *some* just? This is a pertinent inquiry, for "*just*" is indefinite and must be formally limited or amplified in the same way as the subject. On Mr. Thynne's doctrine, therefore, two parts of extension must be expressed by the copula, in some such manner as the following: "Man—is in part of its extension—just —in part of its extension." All of this on the doctrine in question save *man* and *just* belongs to the copula; in short, Mr. Thynne maintains that the terms of a proposition are always taken *absolutely,* and that all modification of this absolute meaning belongs not to themselves but to the copula. The absurdity of such a doctrine will be better seen from an example in which the modification of the terms is of a more definite numerical kind than that usually found in the ordinary examples; for as *all* modification of the terms, that is, *everything* indicating the extent of the agreement or difference existing between them, belongs to the copula, then necessarily numerical modification

of extent belongs to it also. Take then the following proposition:—"ten horses are equal in strength to a hundred men." This expounded according to Mr. Thynne's doctrine will become the following:—"horse (taken absolutely)—is, considered under the relation of ten—equal to man (taken absolutely) considered under the relation of one hundred: or a part equal in extent to ten taken out of the whole concept horse—is equal in a given relation, that of strength, to wit, to a part equal to a hundred taken out of the whole concept man." The former way of stating it is contradictory enough, and in the latter surely no one will seriously say that the true subject is the *whole concept horse*, and the true predicate the *whole concept man.*

This criticism would be in part inapplicable, did Mr. Thynne, with Aristotle and some of the older logicians, and indeed with the Compendium itself on which he comments,—did he hold, we say, with these, that the copula is included in the predicate. It is manifest, however, partly from his remarks, and abundantly from his practice, that he does not do so, but with logicians in general considers it simply as the bond of connexion between two terms, and in the last resort, therefore, always the substantive verb.

Mr. Thynne gives the following illustration in confirmation of his doctrine:—

"This is not the only respect in which a circumstance grammatically associated with the subject is logically associated with the copula. In the proposition above, 'no man is a stone,' *no-man* is surely not the subject, for the declaration is intended to be made of man, and not of that which is not man: nor is the copula *is*, for the relation is intended to be one of disagreement. The negation therefore is here logically a modification of the copula, although grammatically of the subject."

If the principle was unfortunate, the illustration is certainly equally so. "In the proposition, 'no man is a stone,'" says Mr. Thynne, "*no-man* is surely not the subject, for the declara-

tion is intended to be made of man, and not of that which is not man." Now, what is the declaration made in the above proposition? It must surely be, "*is a stone*," which, says Mr. Thynne, is intended to be made of man, and not of that which is not man, but which I cannot but think notwithstanding is intended to be made of that which is *not man*, since it cannot be truly said that any stone is a man; and accordingly that *no-man* is the subject. Speaking generally, it may be said that in any negative proposition the negation may fall on the subject, on the predicate, or on the copula; but that on whatever member it falls, it becomes truly a part of that member; falling on the subject therefore in the proposition above, *no-man* is the true subject.

Let us look, however, for a moment more closely into the matter. A proposition is but the reflex in language of a judgment; a judgment is the product of a particular mental act. Now, the whole question is determined by ascertaining specifically *what that act is*. It is, in brief, one of *comparison*. Two things (terms of any kind) are compared together in order to ascertain whether they stand to each other in the relation of determining and determined, of whole and part; in a word, to discover what is the extent of their agreement or difference. Now, does this extent of agreement or difference belong to the objects which are compared together, or to the mind which compares them? Surely when two things are compared together, and found to stand to each other in the relation of part and whole, that affection of quantity belongs to the things, and not simply to the mind which perceives them. But on the theory in question the act of judgment is not only *cognitive*, but *creative*; it not only *perceives a relation*, but also *creates the relation which it perceives*. This involves a double confusion; a confusion in philosophy of the *perceiving mind* with the *things perceived*, of the *mental act* with its *object:* a confusion in logic of *quantity* with *quality*, of the *matter* with the *form* of a proposition, of things to be connected with the bond of their connexion. It is

indeed an error so manifest, that we need not dwell upon its refutation, and one which could only have been committed by so able a logician as Mr. Thynne through great haste, or greater oversight.

We have thus the subject of quantification viewed in almost all the aspects in which it can possibly be considered. The common doctrine considers it in relation to the *subject;* Sir William Hamilton as it affects the *predicate;* Mr. Thynne maintains that it is an affection of the *copula;* while Mr. De Morgan (after Lambert) has elaborated a particular quantification of the *middle term.* This last scheme, however, as but a trivial and practically useless refinement on a doctrine universally held by logicians, may be thrown out of account. Mr. Thynne's notion, we have endeavoured to show, must, as the result of a strange confusion, be at once rejected. The subject and predicate, therefore, alone remain to be considered. The quantification of these terms, as the ultimate constituents of logical analysis, is, we need scarcely say, all-important. Through the working out of quantification in relation to the subject, the existing logic has attained to whatever of perfection of detail it can pretend to; through its working out in relation to the predicate, it will attain to the whole perfection of which, as a science, it is susceptible. The former is substantially the work of Aristotle; the latter is equally so that of Sir William Hamilton.

To sum up, then, the evidence we have gained: We have found, on the one hand, that the express quantification of the predicate has been rejected with singular uniformity throughout the entire history of the science. On the other hand, that it has been sometimes partially adopted in theory, and at other times in various ways applied in practice; only, however, to amend some particular detail of the science—it may be to simplify the process of conversion—it may be to modify, by a problematical exception, some particular rule of syllogism. But we have also seen, that its want has never been signalised as a fundamental de-

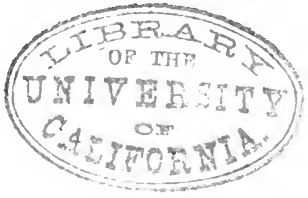
fect in the original logical analysis;—a defect through which the science had been encumbered by unscientific supports—disfigured by unscientific additions—dwarfed by unscientific restrictions, and thus shorn of its true beauty of proportion and completeness; that it has never, therefore, been employed as a principle to reconstruct the whole edifice of the science, and by removing what was useless, rejecting what was false, and supplying what was wanting, to restore it to its perfect and harmonious beauty.

Despite, therefore, the evidence of partial perception which we have adduced, the original statement, "that the principle in its full scientific significance has been altogether overlooked by logicians," is vindicated.

No. II.

ON THE CATHOLIC DOCTRINE TOUCHING THE IMPLICIT QUANTIFICATION OF THE PREDICATE.

Though logicians have with one consent rejected the *explicit*, they have, nevertheless, always held an *implicit* quantification of the predicate. This was indeed absolutely necessary to the existence and working of the science. For since all reasoning is in the last resort but the comparison of two terms with a third term,—but the perception of how far two terms mutually agree or disagree through the perception of how far they agree or disagree with a third,—it is obviously not only important but imperative that the extent of these terms themselves should be taken into account. This is, indeed, the very essence of the reasoning. Apart from this there can be no measurement of extent, and no conclusion of identity or difference of extent as the result of such measurement.



In other words, in any syllogism the process of the reasoning and the evidence of its validity is the same, and it is the following:—the middle term is the mean or measure; in the first place, one extreme is compared with the middle term, and seen to agree with it *so far;* then the other extreme is compared with the middle, and also seen to agree with it *so far;* and thereupon this identity of agreement is affirmed. But, in either case, if I do not know the extent of the term compared, (cannot take it, that is, in some *definite* extent,) I cannot tell *how far* it agrees with the middle. Or, again, if I do not know the extent of the middle term, (cannot take it in some definite extent,) I cannot tell whether the term to be compared agrees with it in extent or not,—whether it is part, or whole, or none. The predicate notion, however, in every reasoning is one of these terms, and stands in one of these relations. It is, therefore, absolutely necessary, as we have said, to the validity of the reasoning, that it should have a *definite quantity;* and a definite quantity, accordingly, it always has had in the science. This quantity, however, instead of being left like that of the subject to reflect itself in language according to the whole extent of its possible variation as an element of formal thought, was made the subject of arbitrary legislation. Logical law enacted that the quantity of the predicate should always be held *particular* in affirmative propositions, and *universal* in negative ones. That logicians by this arbitrary and unjust enactment crippled their science,—crippled it too in a useless and preposterous manner—could be very easily shown. The natural scientific action of one of its parts was at once interfered with; it could only work now under given artificial restrictions—restrictions which had not the slightest shadow of scientific warrant for their imposition. These restrictions are, indeed, not only artificial but capricious, for no reason whatever can be shown why one term of a relation of quantity should be made the subject of arbitrary legislation rather than another. It would have been just as wise

and just as scientific to have laid down arbitrary rules for the quantity of the subject as for that of the predicate. Why not, it may be asked of the logicians, place the subject under the same restrictions, and enact, for instance, that its quantity shall always be held *universal* in affirmative propositions, and *particular* in negative ones?

The whole subject may be illustrated more fully in detail by the use of a figure which we have already partially employed. The subject and the predicate may be said to be the legs on which the syllogism stands. Its free progress, of course, depends on the natural unrestricted action of these members. Logicians have, however, crippled one of these—the predicate—by preventing such natural action. In order, however, that the syllogism might work at all after having been thus maimed, it became necessary to provide some support for the crippled limb. This, accordingly, was found, and in the shape of a body of special rules, a crutch which partially supplied the place of the natural support, was realised. Why did not the logicians, we ask, since they had thus endorsed the principle of such a procedure, destroy the natural action of the other limb also, and provide it with the same artificial support? They would thus have solved the problem, how far the syllogism could proceed when altogether deprived of the native strength of its own members, and supported on *two crutches* instead of one;—an ingenious experiment enough, certainly, but one which bears exactly the same relation to the natural development of the science, that racing in sacks does to the natural exercise of the limbs in walking.

This ingenious problem, however, the logicians have not attempted in its integrity. They have remained satisfied with its partial solution in relation to the predicate. The laws which they have laid down for the regulation of its quantity are, as we have said, two, viz.:—

1°. That in all affirmative propositions the quantity of the predicate is particular.

2°. That in all negative propositions the quantity of the predicate is universal.

On these two axioms, as they are commonly, but of course erroneously termed, the whole detail of the existing logic rests. They have determined its peculiar form and necessitated its special rules. These special rules may indeed be appropriately described as a body of provisions to secure that the predicate is always really taken according to the quantity assigned to it in the axioms. This will be at once manifest by an examination of the demonstrations of those special rules which are sometimes given in logical works. These demonstrations contain of course the reasons on which the rules rest, and these will be found in every case to arise from the necessities of the predicate in relation to its implied quantity. We quote the following in illustration from the Port Royal Logic, where all the special rules are briefly but adequately explained.

"RULES OF THE FIRST FIGURE.

"*The minor must be affirmative;*

"For, if it were negative, the major would be affirmative by the third general rule, and the conclusion negative by the fifth; therefore the *greater term* would be taken *universally in the conclusion,* since it would be negative, and *particularly in the major;* for it is *its attribute* in this figure, and would be affirmative, thus violating the second rule, which forbids us to conclude from the particular to the general. This reason holds also in the third figure, where the greater term is also attribute in the major.

"*The major must be universal;*

"For, the minor being affirmative, by the preceding rule, the *middle term, which is its attribute, is taken particularly;* therefore it must be universal in the major, where it is subject, which renders this proposition universal; otherwise it will be taken

twice particularly, contrary to the first general rule."—Pp. 189, 190.

"FIRST RULE OF THE SECOND FIGURE.

"*One of the two propositions must be negative, and consequently the conclusion also, by the sixth general rule;*

"For, if both propositions were affirmative, *the middle, which is here always attribute, would be taken twice particularly*, contrary to the first general rule."—P. 193.

The necessity of these special rules is manifest, for of those of the first figure, if the *former* were violated, a term which, as the predicate of an affirmative proposition, was *particular* in the major premise, would, as the predicate of a negative proposition, become *universal* in the conclusion; if the *latter* were violated, the middle term would, as predicate in the affirmative minor premise, be *particular* there, as well as in the major, and thus remain *undistributed*. The same reason holds in the first rule of the second figure. The other special rules are susceptible of a similar explanation, as may be readily tested, by taking them and the two axioms of quantity, and working out the relation of determination which exists between them. These axioms are thus, as we have said, operative through the whole detail of formal reasoning, as it stands in the existing logic. Rejecting the *explicit*, and accepting only the *implicit* quantification of the predicate, the question to be determined by logicians was, —how many of the possible forms of reasoning are valid without such explicit quantification? The commonly accredited syllogisms were the result of this examination. The special rules which protect them were generalisations from the causes which rendered the rest invalid. Those which severally, according to their figure, obeyed the conditions of these rules, were alone accepted. These reasonings were declared, moreover, not only to embrace all the valid syllogisms which could be obtained under such restrictions, but also to exhaust all the possible forms

allowed by the laws of thought. This is, indeed, one of the grounds expressly taken by Pacius in his rejection of a quantified predicate. He says, (at the close of the second of the extracts given from him earlier in the Appendix,) that the quantification of the predicate is of no use to the syllogism,—that it does not at all aid its validity; and gives a syllogism in Barbara of the first figure in illustration of his statement. The answer to this is easy. The express quantification of the predicate will not, of course, help the validity of those syllogisms which have been expressly constructed so as to be independent of its aid; and the cogency of which, therefore, is complete without such quantification. All the syllogisms of the existing logic are of this kind; and their validity, accordingly, is independent of any such expressed quantity. But this does not at all prove, on the one hand, that even these would not possess a higher formal completeness with the quantity of the predicate expressed; or on the other hand, that there may not be *other syllogisms* whose validity entirely depends on such expressed quantity. This is indeed the case; for on the one hand, everything of force in a formal science ought to be formally expressed; and on the other, *there are* a number of forms of reasoning guaranteed by the laws of thought, whose validity is not only contributed to, but *constituted by*, the expressed quantity of the predicate. Looked at therefore from the lower ground of the axioms of quantity, and the reasonings possible through them, the expressed quantity of the predicate is not absolutely necessary; but, regarded from the higher ground of the laws of thought, and their scientific development, this quantification is not only imperative, but indispensable.

These so-called axioms of quantity, it may be worth while to notice, are but corollaries from the laws laid down touching regular predication; for if the only lawful predication is that in which a genus is predicated of its species, since the genus is always of wider extent than its species, when so predicated it can

only be taken in *some part* of its whole extent, that is say *particularly*. Again, if it be unlawful to affix marks of quantity to the predicate, we cannot deny *some part* of a genus of one of its species; and all negative propositions must therefore contain repugnant species or genera, which will accordingly be denied of each other in their *whole extent*. The rules for predication, and those for the quantity of the predicate, thus at bottom imply each other. It would perhaps be difficult to say which were cause and which effect; or rather, it would probably be nearer the truth to say, that they are both the result of the same defective analysis and want of scientific insight. Out of this original defect have arisen, as we have shown, the complexity, the restriction, and the disorder, of which the special rules, and the syllogisms they indorse, are at once the evidence and the result.

The simplicity of the reasoning process, contrasted with the complexity of the rules devised for its guidance and protection, could hardly, however, fail to arrest the attention of some of the many thinkers who have from time to time undertaken their exposition. They accordingly have, in various ways, betrayed their sense of the want of thorough scientific simplicity and completeness which these rules indicated: some, as we have seen, by falling upon stray syllogisms which violated the rules, but which were nevertheless quite valid, without, however, being able to offer any theoretic explanation of the fact: others, again, by simplifying the syllogistic law in theory, without being able to show how this theoretical simplification could be realised in actual practice. A curious instance of this latter kind occurs in the Logic of Caspar Wyss, which was published at Geneva (where he was for some time Professor) in the year 1669. He reduces all the rules of syllogism, both the *general* and the *special*, to the single one, *that every syllogism should have three and only three terms*. We subjoin his reduction of the special rules as a specimen of the way in which he accomplishes this:—

" *De Regulis specialibus Syllogismorum.*

" Regulæ speciales syllogismorum sequentes pronuntur a Philosophis : I^a. *Regula specialis* est : *In prima figura, major debet esse universalis.* Unde hic syllogismus non valet : Omnis homo non est in hac urbe ; Tu es homo ; E. tu non es in hac urbe. Item : Omne animal non est rationale ; Sed homo est animal ; E. homo non est rationalis.

" Verum contra hanc regulam dici potest, illam non esse universaliter veram ; si enim tollatur ambiguitas, et sint tantum tres termini in syllogismo, syllogismi primæ figuræ, ex majori particulari, sunt legitimi : v. g. Aliquod animal est rationale ; Homo est animal ; E. homo est rationalis. Quare dicendum est : syllogismos superius allatos esse vitiosos, quia in iis dantur quatuor termini. In priore enim syllogismo, homo aliter sumitur in majore, quam in minore. In posteriore vero, animal aliter sumitur in majore, quam in minore, ut patet attendenti.

" II^a. *Regula specialis* est : *In prima figura, minor debet esse affirmata.* Unde hic syllogismus non valet : Omnis asinus est animal ; Sed homo non est asinus ; E. homo non est animal. Item : Omne rationale est animal ; Solus homo est rationalis ; E. solus homo est animal.

" Verum contra hanc regulam, dici potest, illam non esse universaliter veram, eo, quod dentur syllogismi primæ figuræ, ex minore negata, qui sunt legitimi : v. g. Qui non credit in Christum damnabitur ; Sed reprobi non credunt in Christum ; E. reprobi damnabuntur. Quare *dicendum* est, syllogismos primæ figuræ, ex minore negata, esse legitimos, si sint tantum tres ter-

mini; esse vero vitiosos, si sint quatuor termini, ut patet in syllogismis superius allatis, in quibus sunt duo media, adeoque quatuor termini. Nam in priore, asinus est medium in majore, non asinus vero, est medium in minore. In posteriore vero syllogismo, rationale est medium in majore, non rationale vero, est medium in minore. *Adde*, quod in ejusmodi syllogismis, animal aliter sumatur in majore, quam in conclusione, ut patet attendenti.

" III^a. *Regula specialis* est: *In secunda figura, major debet esse universalis.*

" Verum contra hanc regulam dici potest, syllogismos secundæ figuræ ex majore particulari esse bonos, si sint tantum tres termini, non æquivoci; esse vero vitiosos, si sint quatuor termini, sicut diximus, de syllogismis primæ figuræ; adeoque hæc regula, est superflua.

" IV^a. *Regula specialis* est: *In secunda figura, altera præmissarum debet esse negans;* juxta illud vulgatum: ex puris affirmantibus, in secunda figura, nihil concluditur. Quare hic syllogismus non valet: Asinus est animal; Sed homo est animal; E. homo est asinus. Item: Asinus habet aures; Tu habes aures; E. tu es asinus.

" Verum, contra hanc regulam dici potest, illam non esse universaliter veram, cum multi sint syllogismi recti, in secunda figura, ex puris affirmantibus: v. g. Omne rationale est risibile; Omnis homo est risibilis; E. omnis homo est rationalis. Item: Omne brutum est animal; Omnis asinus est animal; E. omnis asinus est brutum. Quare *dicendum* est, ex puris affirmantibus, in secunda figura recte concludi, si sint tantum tres termini;

male vero concludi, si sint quatuor termini, ut patet in syllogismis vitiosis superius allatis. In priore enim, animal aliter sumitur in majore quam in minore; in majore enim, sumitur pro animali contracto ad asinum, in minore vero, pro animali contracto ad hominem. In posteriore vero syllogismo, medium, scilicet aures, aliter sumitur in majore ac in minore. In majore enim, aures sumuntur pro auribus asininis; in minore vero, pro auribus humanis.

" V^a. *Regula specialis* est: *In tertia figura, minor debet esse affirmata.*

" Verum, contra hanc regulam dici potest, syllogismos tertiæ figuræ, ex minori negante, posse esse rectos, modo, non sint quatuor termini, et nullus terminus sit æquivocus, sicuti diximus de syllogismis primæ figuræ; atque adeo hæc regula est superflua.

" VI^a. *Regula specialis* est: *In tertia figura, conclusio debet esse particularis:* Unde hic syllogismus non valet: Omnis homo est rationalis; Omnis homo est animal; E. omne animal est rationale.

" Verum, contra hanc regulam dici potest, syllogismos tertiæ figuræ, conclusionem universalem habentes, esse rectos, modo, sint tantum tres termini non æquivoci. In syllogismo autem, superius allato, sunt quatuor termini, eo, quod animal aliter sumatur in conclusione, aliter vero in minore. Quod si, animal, in conclusione sumatur eodem modo ac in minore, scilicet pro animali identificato cum homine, conclusio erit vera, omne scilicet animal, identificatum cum homine, esse rationale; et sic, syllogismus erit rectus, ut patet attendenti.

" Ex his omnibus *patet:* omnes regulas syllogismorum, esse superfluas, hac unica excepta, *in syllogismo, debent esse tantum tres*

termini, non plures, nec pauciores; et per consequens, omnia sophismata, ad unum posse revocari, scilicet ad sophisma ab æquivocatione." *Logica C. Wyssii.* Genevæ, 1669, pp. 318-321.

All that is here said touching the certainty of obtaining valid syllogisms, if we only avoid having more than three terms, is quite true; but the question arises, *how* are we, under the existing syllogistic forms, to avoid having more than three terms? The answer is more simple than satisfactory. It is, by observing those very precautions which the special rules enjoin;—in other words, by recalling in practice the code which had been theoretically abolished. The reduction of the special rules is so far just, but not a single step is thus taken towards relieving the science in its practical working from the necessity which imposed them. This could only have been done by the express quantification of the predicate, without which, indeed, many of the syllogisms given by Wyss in his reduction are formally worthless, but of which he does not seem to have had a glimpse.

No. III.

ON FIGURE.

THE opinions which have been from time to time held by logicians touching the nature and value of the Figures, (that is to say, of the second and third,) seem to have been very fluctuating, if not inconsistent and even contradictory. Some have maintained their independence as separate forms of reasoning. Others, again, and these are the great majority, have maintained, that whatever value they possess is reflected on them from the first figure, and thus solely derived from their connexion

more or less direct with it. Of the former, some inconsequently retained the doctrine of *reduction*, and thus neutralised by a vicious practice their purer faith; a few, again, altogether rejected it; while Valla (abolishing the third) even proposes to reduce the moods of the first figure to those of the second. Then, again, with regard to the *different members* of the syllogism in these figures, opinions seem to have been almost equally divided. The great majority maintained that the syllogisms in these figures had a determinate *major* and *minor* premise, and consequently a single determinate conclusion. Others, again, could see no grounds sufficiently decisive on which to establish such certainty of premise, and held, as Apuleius and Valla, in certain cases, two conclusions. The former, however, while at one in their belief, are by no means unanimous as to the grounds on which they vindicate a determinate major and minor premise to these figures. They all agree, of course, that the major premise is that in which the *major term* is found. All the difficulty lay in discovering the major term; and the ways in which this was attempted to be done are, so far as I have met with them, of the most inconsequent and assumptive kind.

Sometimes the *major* term was held to be the predicate of the question, or rather the term occupying the predicate place in the question, that, to wit, touching which the doubt arises; for example, if it were inquired whether man were a stone, *stone* would on this doctrine be the major term. Sometimes, again, the major was held to be the term which was first enounced; and often enough a major term was conveniently postulated through the arbitrary assumption of a major premise. The methods, indeed, by which it has been attempted to vindicate determinate members to the syllogisms of these figures, all resolve themselves, in the last resort, to *a begging of the question.* This was generally done in one of two ways; either a determinate conclusion was begged in order to establish determinate premises, or determinate premises were

begged in order to obtain a single determinate conclusion. I had intended to have gone into this whole question at some length historically, and for this purpose had marked a number of references in various logical writers; but though those are numerous and varied in character, I do not feel that I am by any means in possession of sufficient evidence to determine historically what the catholic doctrine in relation to the above points really was. I have accordingly thrown them aside, and must for the present leave the statement given in the body of the work as it stands.

One thing, however, is plain; that from the earliest to the latest times the procedure of the other figures was felt to be less direct, and their conclusion less authoritative than those of the first. To rectify this imperfection two processes have been devised. The first—that of *Reduction*—is of old date in the science, and is that usually practised by the logicians; the second —which may be termed that of *Exposition*—is comparatively new; for though anticipated in some of its details, it is substantially Kant's.* This process is that briefly expounded and applied in the text. These two processes have this much in common—that they accomplish their end by the transposition and conversion of propositions. In the former, however, the change made in the proposition is accomplished by formal conversion, in the latter by real inference. Of *reduction* we have already spoken in the Essay, and need not dwell upon it again here. With regard to the process of Kant, it is itself as tedious and involved as are the reasonings which it is employed to explicate. It is at best but a round-about way of accomplishing what perhaps there is no need for doing at all. The new doctrine, in-

* Kant first expounded this speculation of his in a tract published in 1762, and entitled, "*The false Subtilty of the Four Syllogistic Figures Demonstrated,*" (Die falsche Spitzfindigkeit der vier Syllogistischen Figuren erwiesen.) This is, I believe, republished with Kant's Logic, in the French translation of that work by M. Tissot.

deed, does away with the necessity or usefulness of any such process. On that doctrine this exposition is itself expounded, and this abolition of the figures itself abolished:—figure appears in its true character as an unessential variation of syllogistic form; the several figures remain in their integrity with whatever of special value they ever possessed, while the essential form of the reasoning, when fully stated, is manifest through all the accidental positions of its constituent elements. The same reasoning may be given in either of these accidental varieties of position; but since it obviously appears as essentially *one*, its cogency remains the same, and reduction and exposition are therefore equally vain and useless.

No. IV.

ON NOTATION.

The notation employed in the text is that of one of the systems devised by Sir W. Hamilton, in order to represent to the eye the various possible forms of reasoning by distinctive symbols. It has all the virtues of a perfect notation. It is simple, distinctive,* perspicuous, and complete. It can represent *any*

* That it be *distinctive* is a virtue of first account in any system of logical notation; for to borrow the accredited signs of any other science is on every account to be avoided. I need scarcely say, therefore, how earnestly I unite with Mr. Mansell in deprecating "that mathematical method of exposition," which is, as he truly says, in relation to logic, "alike injurious to the science and repulsive to the learner."

The introduction of mathematical symbols and methods of working into logic is indeed, on every account, to be protested against by all who are interested in the welfare of the science. The rejection of these is the more to be insisted on, as well-meaning efforts still continue to be made to improve logic by mathematical treatment, if not indeed to afford it mathe-

relation of the terms, *any* order of the propositions, *any* extent of quantity. The letters represent the terms, the points their quantity, and the lines with the letters the propositions. The letters express, by position to the eye, the relation which the terms have in thought, the middle being placed between the extremes. The meaning of the *points* has been already explained; the *colon* denotes *universal* quantity, "all;" the comma *particular* quantity, "some." Of the lines the shorter denote the premises, the longer the conclusion; the thick end denotes the *subject*, the thin end the *predicate*. Thus the first syllogism given in the table would read as follows:—

All B is all A.
All C is all B. Therefore,
All C is all A.

Negative propositions are marked by crossing the copulative line on which the negation falls, as shown in the *premises* of the negative syllogisms given in the table. I may here notice that the cross is absent from the lines of conclusion in these syllogisms by accident, and not by design. It was omitted in the cutting of the type; and I must request the reader to be good enough to supply it by the pen.

This system of notation will now probably be generally known to logical students through the exposition of it given by Mr.

matical protection. With all such help, however, it can well afford to dispense; if it could not—indeed, if this were not to it hindrance rather than help—it would have no claim to rank as a separate science. The notion of extending the sphere of mathematics so as to include logic, is as theoretically absurd as its realisation is practically impossible. To identify logic with mathematics is to make the whole equal to its part: while to subordinate the former to the latter is to increase the marvel, by making the whole less than its part. And those who, without attempting this, display their skill by translating logical forms into mathematical language, accomplish a work just about as useful and praiseworthy as that "of the two zealous, but thick-headed logicians—Herlinus and Dasypodius by name—who rendered the first six books of Euclid into formal syllogisms." All such endeavours possess the singular merit of making logic as repulsive as possible, without doing the least service to mathematics.

Thomson in his "Outline of the Laws of Thought," where further details respecting it may be found. Mr. Thomson says, in introducing his explanation, that "many of the different elements of the notation are not new." With all respect for the statement of so careful and zealous a student of logic as Mr. Thomson, I must say I cannot but think that this is a mistake. I do not know, of course, what authority Mr. Thomson may have for his statement; but, with some general knowledge of most of the previous systems of logical notation which have been employed, I cannot recall any which anticipate the present, either in notion or detail; unless, indeed, the bare use of lines, though in a totally different manner, can be said to do so. I cannot think, however, that this is what Mr. Thomson refers to; for the *linear notation* is a separate system, altogether distinct from the one in question.

I had intended to have introduced here fuller tables, running the positive and negative syllogisms through *all* the figures, as well as some specimens of other systems of notation which Sir William Hamilton has kindly placed at my disposal. I am not without hope, however, that Sir William will himself publish them in full before very long; and I need scarcely say, therefore, how gladly I relinquish their partial introduction here. I know how earnestly all who are interested in logical science will unite with me in the hope that Sir William Hamilton's health and leisure may be such as to enable him to carry through the press at no distant interval some portion of his promised work.

NOTE BY SIR WILLIAM HAMILTON.

The following note contains a summary of my more matured doctrine of the Syllogism, in so far as it is relative to the preceding Essay.

All *mediate* inference is one—that incorrectly called *Categorical;* for the *Conjunctive* and *Disjunctive* forms of *Hypothetical* reasoning are reducible to immediate inferences.

Mentally one, the Categorical Syllogism, according to its order of enouncement, is either *Analytic* or *Synthetic.* Analytic, if (what is inappropriately styled) the conclusion be expressed first, and (what are inappropriately styled) the premises be then stated as its reasons. Synthetic, if the premises precede, and, as it were, effectuate the conclusion. These general forms of the syllogism can with ease be distinguished by a competent notation; and every special variety in the one has its corresponding variety in the other.

Taking the syllogism under the *latter* form, (which, though perhaps less natural, has been alone cultivated by logicians, and to which, therefore, exclusively all logical nomenclature is relative,)—the syllogism is again divided into the *Unfigured* and the *Figured.*

The Unfigured Syllogism is that in which the terms compared do not stand to each other in the reciprocal relation of subject and predicate, being in the same proposition, either both subjects or both predicates. Here the dependency of Breadth and Depth, (Extension and Intension, Extension and Comprehension, &c.,) does not subsist, and the order, accordingly, of the premises is wholly arbitrary. This form has been overlooked by the logicians, though equally worthy of development as any

other; in fact, it affords a key to the whole mystery of Syllogism. And what is curious, the canon by which this syllogism is regulated, (what may be called that of logical Analogy or Proportion,) has, for above five centuries, been commonly stated as the one principle of reasoning, whilst the form of reasoning itself, to which it properly applies, has never been generalized. This canon, which had been often erroneously, and never adequately enounced, in rules four, three, two, or one, is as follows:—*In as far as two notions,* (notions proper or individuals,) *either both agree, or one agreeing, the other does not, with a common third notion; in so far, these notions do or do not agree with each other.*—The propositions of this syllogism in no-figure are marked in the scheme of pure logical notation by horizontal lines of uniform breadth.

In the Figured Syllogism, the terms compared are severally subject and predicate, consequently, in reference to each other, containing and contained in the counter wholes of Intension and Extension. Its canon is:—*What worse relation of subject and predicate subsists between either of two terms and a common third term, with which one, at least, is positively related; that relation subsists between the two terms themselves.*—In the scheme of pure logical notation a horizontal tapering line marks this relation; the subject standing at the broad, the predicate at the pointed end.

There are *three*, and only three, Figures—the same as those of Aristotle; and in each of these we may distinguish the orders of Breadth and of Depth.

The *First* Figure emerges, when the middle term is subject of the one extreme and predicate of the other; that is, when we pass from the one extreme to the other, through the middle, in the order whether of Extension or of Intension. In the notation of this Figure, we may of course arbitrarily make either of these orders to proceed from left to right, or from right to left; that is, two arrangements are competent.—There is here, determinately, one direct and one indirect conclusion.

The *Second* Figure arises, when the middle term is the predicate of both extremes; the order of Breadth proceeding from middle to extremes, the order of Depth from extremes to middle.

The *Third* Figure is determined, when the middle term is the subject of both extremes; the order of Extension proceeding from extremes to middle, the order of Intension from middle to extremes.

In the Second and Third Figures there is thus only one arrangement possible in logical notation. And as Extension and Intension are here in equilibrium, there is no definite major and minor premise, and consequently no indirect, but two indifferent conclusions.—This is best marked by two crossing lines under the premises, each marking the extreme standing to the other as subject or as predicate.

Of course each Figure has its own canon, but these it is not here requisite to state. The First Figure, besides its more general canon, has also two more special,—one for Syllogisms in the order of Extension, and one for Syllogisms in the order of Intension. And what is remarkable, Aristotle's *Dictum de Omni*, &c., (in the Prior Analytics,) gives that for Extension, whilst his rule—*Prædicatum prædicati*, &c., (in the Categories,) affords that for Intension, although this last order of Syllogism was not developed by him or the logicians;—both inadequately.

In regard to the *notation of Quality* and *Quantity* in the syllogisms unfigured and figured:—Negation is marked by a perpendicular line, which may be applied to the copula, to the term, or to the quantification.—As to Quantity, (for there are subordinate distinctions,) it is sufficient here to state, that there is denoted—by the sign [ˏ or ˎ] (for the quantity of one term ought to face the other), *some*;—by the sign [⁚], *all*;—by the sign [·], *a half*;—by the sign [⁚ˏ or ⁚ˎ], *more than a half*. The last two are only of use to mark the *ultra-total* distribution of the middle term of a syllogism, between both the premises, as affording a certain inference, valid, but of little utility. This I

once thought had been first generalized by me, but I have since found it fully stated and fairly appreciated by Lambert, to say nothing of Frommichen.

Above (p. 76) is a detail of my pure logical notation, as applicable to the thirty-six moods of the first figure. The order there is not, however, that which I have adopted. The following is my final arrangement, and within brackets is its correspondence with the numbers of that given above:—The moods are either A) *Balanced*, or B) *Unbalanced*. In the former class both *terms* and *propositions* are balanced, and it contains two moods—i; ii, [=i; ii.] In the latter class there are two subdivisions. For either, a) the *terms* are unbalanced,—iii, iv, [=xi, xii]; or, b) both the *terms* and *propositions* are unbalanced, —v, vi; vii, viii; ix, x; xi, xii, [=vii, viii; iii, iv; v, vi; ix, x.] The following equation applies to my table of moods given in Mr. Thomson's Laws of Thought:—i; ii; xi, xii; vii, viii; iii, iv; v, vi; ix, x.—The present arrangement is also more minutely determined by another principle, but this it is not here requisite to state.

If we apply the moods to any *matter* however abstract, say letters, there will emerge *forty-two* syllogisms; for the formal identity of the balanced moods will then be distinguished by a material difference. On the contrary, if we regard the mere *formal* equivalence of the moods, these will be reduced to *twenty-one* reasonings,—*seven affirmative*, and *fourteen negative*. Of the balanced moods, i and ii are converted each into itself; of the unbalanced, every odd, and the even number immediately following, are convertible; and in negatives, the first and second moods (*a*, *b*) of the corresponding syzygy or jugation, is reduced from or to the second and first moods (*b*, *a*) of its reciprocal.

There are no exceptions. The canon is thorough-going. Only it must be observed: that the doctrine is erroneous which teaches, that a universal negation is not a *worse* relation than a particular; and that the identity of a negative with an affirma-

tive mood, is regulated exclusively by the identity in *quantity* of the two syzygies or antecedents. The Greeks, in looking to the conjugation of the premises alone, are more accurate than the Latins, who regard all the three propositions of a syllogism in the determination of a mood.

It is not to be forgotten, that as the correlation of the logical terms ought to be known only from the expression, (ex facie propositionis aut syllogismi,) for all other knowledge of the reciprocal dependence of notions is contingent, material, and extralogical; and as the employment of letters, following upon each other in alphabetical order, may naturally suggest a corresponding subordination in the concepts which they denote: I have adopted the signs C and Γ, which are each the third letter in its respective alphabet, for the extremes; and the sign M, for the middle term of the syllogism. The scheme is thus emancipated from all external associations, and otherwise left free in application. I also transpose the former symbols in the interconvertible moods; so that whereas in the one stand C M Γ, in the other stand Γ M C.

W. H.

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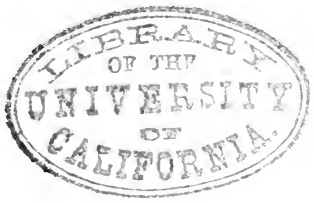
ERRATA.

Supply brackets to the extracts given from Ploucquet at the foot of pages 22, 23.

Page 48, second line from bottom, *for* premiss, *read* premise.

„ 73, line 17, note, *for* tracing, *read* touching.

„ 85, line 20, *for* eisque, *read* ejusque.



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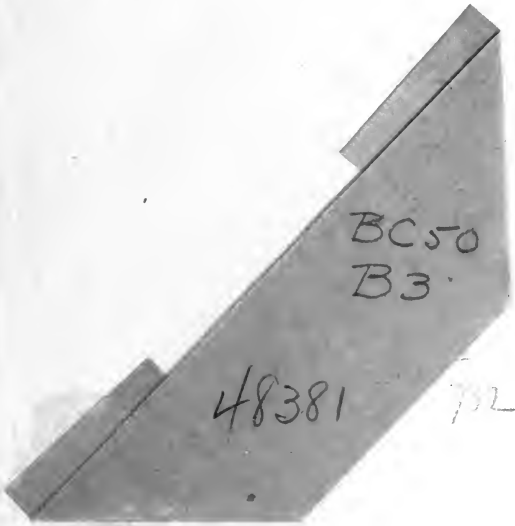

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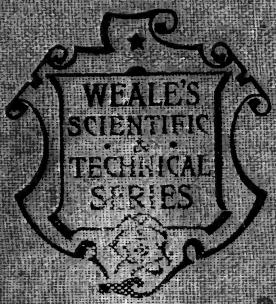

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PREFACE.

LITTLE more will be expected from a work of the following description, than that it should contain an intelligible and concise exposition of those facts and principles which form, as it were, the groundwork of logical science. Necessarily, therefore, it must be, for the most part, a compilation of such views as have obtained general acceptance, and can lay but little claim to any high degree of originality.

At the same time, I may be permitted to state that some features exist which serve to distinguish this Treatise from its numerous predecessors, and which will, I hope, prove of service to the student by inciting him to examine for himself such theories and principles as come under his notice. Those features to which I more particularly allude, are the reference of all so-called "Immediate Inferences" to the class of syllogisms; the grounds for an extended adoption of Aristotle's *Dictum;* the refutation of the charge that every syllogism involves a *petitio principii;* the explication of the inductive theory in Applied Logic; and, finally,

the doctrine of classification, by which every detail and branch of Logic is shown to exist in harmonious unison. And as these views are, in a measure, opposed to those contained in works of great repute, I have appended to the body of this Treatise four Articles, wherein are set forth such arguments as I think sufficient to justify me in advancing the above-mentioned doctrines.

I also deem it advisable to state that it has been my endeavour to give this work as *suggestive* a character as possible; and, therefore, although it belongs to a rudimentary series, professing to treat only upon the first elements of Logic, I am yet not without hope that it will be found a sufficient introduction to such comprehensive and elaborate treatises as those of Mr. Mill, Professor De Morgan, and others. But while I have thus been compelled to satisfy myself in many cases with an enunciation rather than with a full investigation of certain doctrines, I still trust that, in the following pages, the student will find all that is really requisite to give him a fair, practical knowledge of Logic.

The chapter on Applied Logic is, I am sensible, but a mere sketch. As, however, to do justice to so vast a subject would require a great extension of the present limits, and would thus curtail the utility of this Treatise by enhancing its price, I have contented myself with directing the student's attention to such points as are most important, both in theory and practice. For the same reason, nothing beyond the bare outlines is given of such new doctrines as I have here

adopted; all further development of them being deferred to a future occasion.

I take this opportunity of acknowledging my many and great obligations to those writers upon Logic whose works I have consulted; and although it may seem invidious to particularise, yet as, for reasons which will be found specified in their proper place, I have expressly referred to Mr. John Stuart Mill, as being the advocate of certain opinions which are combated in the following pages, I think it only just that I should here record my admiration for the profound philosophy and great attainments which are so apparent in the writings of that gentleman.

S. H. E.

London, January, 1865.

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LOGIC.

INTRODUCTION.

Logic may be not inaptly described as the grammar of thought; that is to say, it reveals and explains the principles according to which our judgments are formed, in much the same manner as grammar analyses the laws which regulate the expression of our thoughts by means of speech. It will, therefore, be seen that Logic is a science of universal extent, inasmuch as wherever any process of reasoning is carried on, there will be found, in full operation, those mental laws which it is the office of Logic to examine and systematise. It does not, however, follow that every person who reasons is a logician, for it is only when a process of judgment is carried on in regular order, and according to the rules derived from a study of the science, that such an appellation could be justly bestowed. And, in like manner, it would be absurd to suppose that there can be no correct reasoning without a good knowledge of Logic; for, in order to perceive the error of such a view, we have only to consider for a moment the mode in which every science is formed. Take, for example, the science of astronomy: the heavenly bodies had been urged through space, by the operation of definite cosmical laws, for ages previous to the discovery of those laws by human philosophers, and it was the very fact of such motions being in progress, which led to the investigation of the principles concerned.

Thus, too, with regard to Logic: men had thought and reasoned according to certain laws, long before Aristotle, by observing and reflecting upon the various judgments which came under his notice, was able to enunciate the great fundamental truth upon which they were based. It is from considerations such as these that we speak of scientific *discoveries*, and not of scientific *inventions;* for the latter term can only be applied to some *new method of accomplishing* a specific object, while the former is always used when we speak of any fresh *law or principle*, which, previously existing, has been brought to light by the exertions of the philosopher. Like, then, as Newton discovered gravitation, so did Aristotle discover the syllogism; and, therefore, the notion that the use of the syllogism is merely *one method* of reasoning, is at once shown to be altogether erroneous. The truth is, that there can be *no other* process of forming a judgment, since every conceivable example of reasoning may, by the application of certain rules, be reduced to the syllogistic form.

From what has now been said, the true value of Logic will be easily discerned, and as its subject is one which lies at the root of all other sciences, its importance can hardly be overestimated. Its principal use is that it enables us to reason correctly, by furnishing us with various rules and standards wherewith to test the validity of any argument that may be brought before us. And here it is requisite to guard against a very prevalent misconception; I allude to the idea, that, by means of Logic, one may ascertain the *truth or falsehood* of any statement. The source of this error is to be found in the supposition that Logic is concerned with the *subject* of the various statements (technically, propositions) whose relations to each other it investigates; whereas, in reality, it merely considers their *form*. Thus, the two propositions, "Water is a fluid," and, "Evil is good," would by a logician be considered as precisely similar, although one of them is false,

and the other true. Again, the following argument or syllogism—

All fluids are poisonous,
Water is a fluid;
Therefore Water is poisonous,

is perfectly valid and correct, although the conclusion arrived at is false. To render this point quite plain and intelligible, let us adopt the following course: it was above stated that Logic merely considers the *form* and not the *subject* (or *matter*) of propositions; accordingly, for all logical purposes, we shall not alter the nature of the propositions employed, if we substitute letters for the words we used to express the substances or notions of which we spoke. Thus, instead of "water is a fluid," let us say "A is B," and for "evil is good," let us put "C is D:" we then see at once, that in both instances we use exactly the same kind of proposition. Again, let us similarly convert the syllogism: we have—

All A's are B,
C is an A;
Therefore C is B;

an argument which remains unalterable in *form*, no matter what ideas are expressed by the letters.*

This it is which confers such rigorous accuracy upon all the results and developments of Logic. Indeed, as Professor De Morgan has said, Mathematics and Logic are the two *exact* sciences. The primary doctrines of chemistry may require alteration as new combinations of the elements are brought to light; the progressive theories of physiology are modified with every advance of microscopical investigation; the glorious revelations of astronomy present an ever-changing aspect; but Logic, like Mathematics, abides, eternal and immutable.

The preceding remarks will probably have pointed out to the reader that Logic is concerned with language as distin-

* For further information as to form and matter see page 39 *et seq.*

guished from the ideas conveyed by the use of words; but in order that the student may be well grounded in the fundamental truths of the science before he proceeds to study its details, I shall add some further observations upon this point.

Language in its ordinary sense, that is, speech, is useful as a means of communication in two ways: it enables us to minutely describe, or, in other words, to analyse, our various ideas, and it also enables us to convey, by a single sound or sign, the combined impression of many particulars. Take, for example, this description:

> "I gazed upon her form
> Transcendent, and upon her face which gleamed
> Pale through her tears, like some fair statue bathed
> In the cold moonlight; and I marked the mute,
> Sad eloquence of that love-charged heart
> Which quickly heaved its alabaster veil
> In trembling fear."

Here gradually dawn upon us the many subjects of attention which exist in a single object, and it is only by means of a protracted analysis such as the above, that we are able to convey a complete idea of it. But then, again, we sometimes wish to express the notion of a numerous class of objects, in such a manner that the impression produced may serve for any one of them. Thus, suppose the objects were men, horses, cows, sheep, lions, &c.: we should merely confine our attention to those points in which they resembled each other, and should bestow a name upon this group of qualities, such as "animal," by the use of which we might attain the desired end. This process is the reverse of the first, but at the same time is in a measure dependent upon it, for in order to ascertain the points of resemblance between various objects, a partial analysis is at all events necessary. Accordingly, Logic takes cognizance of both operations, and investigates the relations which subsist between them and the act of reasoning itself.

It has been said above that language enables us to convey by a single sound or sign, the combined impression of many particulars. Now it is our ability to do this, which alone enables us to conduct a process of reasoning; or otherwise we should find it impossible to judge of the relations between two ideas or objects—a condition which is evidently essential to an argument. One of the most curious proofs of this is afforded by deaf-and-dumb persons, who, when they have once been taught to speak by means of their fingers, are observed to use this means of recording their impressions, even when thinking alone. And it has been asserted, that "it will be found by any one who will question a deaf-mute who has been taught language after having grown up, that no such thing as a train of reasoning had ever passed through his mind before he was taught."*

We have hitherto considered Logic purely as a Science, but it is very frequently regarded as an Art, and perhaps it is this mode of viewing it which holds out the strongest incentive to the student. For it can only be the few who will voluntarily engage in the study of principles which, complete in themselves, give promise of no result beyond that delight which naturally arises from the consideration of organic symmetry and perfection; the great majority being altogether occupied with the hope of turning their knowledge to some useful purpose. Therefore, in the following pages I shall endeavour to give as practical an effect as possible to the various laws of thought which we shall investigate; and the student will thus find that Logic, instead of being merely an "ingenious recreation," is in reality a powerful aid to the prosecution of all other studies. Not that reasoning alone will suffice for the *discovery* of truth, as to do this an extended *observation of facts* is indispensable; but when we have collected a sufficient quantity of facts, we shall find that an

* Whately's "Logic," p. 13.

acquaintance with Logic will greatly assist us in deducing a correct inference.

I now trust that a tolerably clear notion has been gained of the nature and extent of Logic; and in the next place I shall briefly describe the method of proceeding which I intend to adopt in my explanation of the science. First, then, it will be advisable to select some example of pure reasoning, and, having dissected it, to point out the various members of which it is composed, together with the principles which form, as it were, the framework of the structure. We shall thus obtain a bird's-eye view of the country before us, and we shall be able to advance without doubt or hesitation to the end of our journey. Accordingly, it will next become our duty to examine each branch separately and in detail, which being done, we shall proceed to the consideration of the various combinations formed by these branches, and so at length we shall be enabled to construct, or to analyse at pleasure, any train of argument, however extensive it may be. Here, strictly speaking, the study of Logic as such should terminate; but in order that the utility of this treatise may be increased, I shall devote a chapter to the discussion of the several fallacies which are of most frequent occurrence, giving such rules for their treatment as have been found most effectual. The concluding portion of the work will consist of some remarks upon the proper application of Logic, with various illustrative examples.

Such is the course which I propose to take, and if the student be not dismayed by the shadowy anticipation of technical difficulties which have no real existence, he will find an ample reward for all his labours. A systematic regulation of his intellect; a probe wherewith to examine the most mysterious doctrines of philosophy; a wand before whose potent touch the stately fabric of deceit and fraud will disappear;—these are but a few of the benefits to be obtained by a study of Logical science.

OF THE
UNIVERSITY
OF
CALIFORNIA

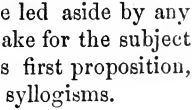
A TREATISE ON LOGIC.

CHAPTER I.

AN INQUIRY INTO THE VARIOUS MEMBERS OF AN ARGUMENT.

It has already been stated that our first step towards a right understanding of Logic must be a strict examination of some definite argument. Now, as we are not all concerned with the *subject* of the reasoning, it will be the best plan for us to choose some example which shall present us with the fewest and most simple ideas, so that we may devote our whole attention to the reasoning *process*, and not be led aside by any extraneous matters. Accordingly, let us take for the subject of our investigation, the proof of Euclid's first proposition, which may be thus stated in arguments or syllogisms.

1. The radii of the same circle are equal to one another,
   A C and A B are radii of the same circle B C D;
   ∴ A C is equal to A B.



2. The radii of the same circle are equal to one another,
   B C and A B are radii of the same circle A C E;
   ∴ B C is equal to A B.
3. Things which are equal to the same thing are equal to one another,
   A C and B C are equal to the same thing (viz. A B);
   ∴ A C is equal to B C.

Taking any one of the above syllogisms, we see that it is composed of three statements, among which this relation subsists; that if we admit the truth of the first two, we cannot

avoid admitting the truth of the last. This last statement is termed the *conclusion*; the other two being called the *premises*. And here the question comes—why is it, that, having admitted the premises, we are compelled to admit the conclusion? To answer this we must examine the constitution of each premiss, and ascertain whatever is implied thereby. Thus, in the first of the syllogisms given above, we find as a commencement, the following assertion or proposition: —"radii of the same circle are equal to one another:" where a certain property, viz., "equality," is asserted, or, in logical language, *predicated*, of a group or class of objects, viz., "radii of the same circle." That is to say, "equality" is a property common to every individual comprehended in the class. The second proposition is to this effect:—"A C and A B are radii of the same circle;" that is, we assert A C and A B to be individuals of that very class, concerning which we admitted that "equality" was common to every one of its members. Consequently we are compelled to admit that A C and A B possess the property of "equality," and this admission forms the conclusion.

Our mode of procedure has therefore been as follows: we first predicate something of a certain class of objects; we then assert that certain individuals belong to that class; and lastly, we predicate the same thing of the individuals which we had predicated of the class.

Now suppose the syllogism had stood thus: "Radii of the same circle are *not* equal to one another; A C and A B are radii of the same circle; therefore A C is not equal to A B:" it would still be perfectly valid, for, having denied that a certain property is enjoyed by a class of objects among which we admit certain individuals to be, we must necessarily deny that those individuals possess the property in question.

We thus arrive at this axiom or law: "Whatever is affirmed or denied altogether of any whole, may in like manner be affirmed or denied of any individual part belonging to, or comprehended in, that whole." Aristotle was the first who distinctly enunciated this great truth, and it is commonly known as "Aristotle's Dictum," or the "*dictum de omni et nullo*."

It may at first seem strange that a statement so simple and obvious should be characterised as a great truth; but a very little reflection will soon convince us that any law which is of universal extent and application, must be the more valuable according as it is the more simple; and therefore it is with justice that Aristotle is honoured for having enabled us to explain the formation and examine the validity of any argument whatever, in so plain and satisfactory a manner. Another fact also which will appear improbable, is that the dictum may be universally applied; that is to say, no syllogism can be valid or admissible unless it strictly complies with the requirements of the dictum, and in a later portion of this work rules will be found by means of which it is possible to bring every specimen of reasoning to this test. Indeed, if we would become thoroughly acquainted with the principles of logical science, we must invariably bear in mind the dependence of every train of thought upon the dictum of Aristotle.

But it is now time that we should revert again to our example of reasoning, and continue the division of each syllogism into its component parts. We have already seen that a syllogism consists of three propositions divided into the two premises and the conclusion; we will now examine the propositions themselves more closely. In the statement "radii of the same circle are equal to one another," we see three distinct portions: first, the subject of which we are speaking, and of which something is predicated (that is, asserted or denied); secondly, the attribute or condition which is predicated of the subject; and thirdly, the sign of affirmation or negation. The technical names for these are, the *subject*, the *predicate*, and the *copula*.

In the proposition above quoted it will be observed that the *whole* of the subject is spoken of; for when we say "radii of the same circle," we evidently mean every radius that could possibly be drawn. Accordingly, such a proposition is termed *universal*, as the predicate is universally applied to every part of the subject. But if we had spoken of a portion only of the subject, and had said "*some* of the radii of the same circle are equal to one another," we should have what is called a *particular* proposition inasmuch as the predicate

is affirmed of some particular *part* of the subject, and not of the *whole*. Thus we see that propositions may be always divided into universal and particular, and this distribution is said to be made according to quantity.

Again, "equality" is predicated affirmatively of "radii of the same circle;" the sentence is therefore termed an *affirmative* proposition: while if the predicate had been denied of the subject, thus, "radii of the same circle are *not* equal to one another," it would have been a *negative* proposition. We have, therefore, another system, by means of which to classify every possible proposition, and this distribution is called a division according to *quality*.

And here we have introduced to our notice a very important branch of Logic, namely, division; by means of which mental process we may at all times obtain a distinct grasp of any subject which occupies our attention. Indeed, this faculty would seem to be an inherent principle of our nature, for whatever may be the science, an attempt has always been made from the commencement, to properly classify and arrange its various subdivisions; the best examples of such a course being found in such studies as Natural History, Comparative Anatomy, &c. Accordingly, as Logic instructs us concerning the principles upon which alone a perfect division can be performed, it is an additional proof of the necessity which exists for an intimate acquaintance with that science.

We have now glanced quickly, but I trust intelligibly, at the structure of a syllogism and its component propositions. It remains that we should consider the nature of the *materials* of which the propositions are formed, having already discussed the mode of framing them together. The subject of the first proposition is, "radii of the same circle;" and in saying this we speak of a class, the individuals of which, though they may differ among themselves in many respects, yet have some features common to all. Thus, one radius of a circle will be unlike its fellows as regards position, but it will be exactly similar with respect to magnitude. So, when speaking of a given circle we mention its "radius," we employ a name that may be applied to any straight line whatever that is

drawn from the centre to the circumference. Such a word is called by logicians, a *common-name* or *common-term*, because, as just stated, it is enjoyed in common by a multitude of objects. But if we proceed to the subject of the second proposition, we are met by terms which differ entirely from the preceding, viz., "A C and A B," the names given to individual radii. These of course can only be applied to a single object, and are consequently known as *singular-terms*, thus serving to distinguish the various members of a common-term.

Let us here pause for a moment to consider the results at which we have now arrived, and let us fully comprehend the purport of common and singular terms. We see that a common-term when applied to an object, merely indicates that it possesses certain properties which are shared in like manner by all the other constituents of a specified group. It is, therefore, evident that such a term or name belongs in reality not to an individual, but to a definite combination of qualities which are found in it. And the mode in which a common-term is obtained, is by comparing a number of separate objects, observing the points wherein they agree, combining these points of agreement into one idea, and then giving this combination a name, so that at any future time we may be able to recall the idea without having the trouble to go through the same operations again. Thus, for example, men observed the properties of many natural bodies, and finding that a certain number refused more or less to alter their volume or shape, the name of solidity was conferred upon this property; and, accordingly, whenever we hear the term "solid" applied to anything, we at once know that the body spoken of will resist a change either as to volume or shape. This process of combining various properties into one idea is called *abstraction*, and is the reverse of that previously described, namely *division;* for while the latter is al ogether occupied in discovering the points of difference between various notions, the former exclusively deals with the points of resemblance.

A singular-term is on the contrary employed to designate individuals instead of classes, and therefore is a mere arbi-

trary sign which conveys the notion of one single object. Such are all names of persons, rivers, cities, &c., and even common-terms may be converted into singular-terms by the employment of the demonstrative pronouns, as "this book," "that house," &c. &c.

There is yet another distinction of the members of a proposition, which it will be needful to notice. We have hitherto spoken of the subject and predicate together with the copula; now the two former are called the *terms*, as when a proposition is expressed in logical order they will form its respective boundaries or *terminations*, the copula occupying an intermediate position.

Of these terms it will be observed that there are three in each syllogism; two forming the subject and predicate of the conclusion, while the other is confined to the premises, in both of which it occurs. From these positions it is, that the names of the respective terms are derived; thus, the predicate of the conclusion is called the *major-term*, the subject of the conclusion is known as the *minor-term*, and the remaining term is characterised as being the *middle-term*. These names, too, are used to distinguish the premises, for that proposition which contains the major-term is called the major premiss, while the other, for a similar reason, is styled the minor premiss.

We are now in a condition to perceive clearly the full force of the train of reasoning which we chose in the first place as the subject of our analysis. In the first syllogism, we see that a middle-term, "radii of the same circle," is chosen, with which are respectively compared the major-term, "mutual equality," and the minor term, "A C and A B;" the result of this comparison being, that a certain relation, viz., "mutual equality," may be predicated of A C and A B. In the second syllogism, we have precisely the same major and middle terms, but a different minor-term, which, however, is found to bear a similar relation towards "mutual equality," as did the other minor, "A C and A B." The object then sought to be attained, is to show the equality of certain portions of the two minor-terms, and this is done by employing a fresh middle-term to serve as a means of connecting the idea of "equality"

with the notion "A C and B C." This middle-term is "things which are equal to the same thing," and when it has been properly applied, as in the third syllogism, we attain the desired result, viz., "A C and B C are equal to one another," or "A C is equal to B C."

Finally, let us recapitulate the information which we have acquired from our rapid survey of the extent of Logic. We find that it will be necessary to investigate, first the subject of notions or terms; next, the comparison of terms, or propositions; and finally, the deducing a conclusion from the juxtaposition of two propositions, or in other words, the nature and construction of syllogisms.

Necessarily this preliminary chapter has been somewhat discursive, and has but briefly sketched the more salient principles and branches of Logic. This glimpse of the path before him, however, as stated in the Introduction, will probably prove of great assistance to the student, for he will now proceed to a more detailed examination of the science, with a good notion of what he may expect to meet; a course which is surely preferable to that too often followed, whereby the learner is introduced at once to tedious technicalities, without the slightest idea as to where he will find himself at the end of his study.

CHAPTER II.

OF NOTIONS OR TERMS.

THE student is now about to descend into the plain, and to enter upon that road whose various windings and ultimate end he has recently surveyed from an eminence. Consequently he will for awhile lose sight of the goal, but as he is in a great measure acquainted with the general features of his course, he will not be dismayed if the path should not immediately appear to tend in the desired direction. And here I may mention that at first we shall proceed through a region abounding in hard names; but as the principal technicalities of the science have been already introduced, together with the principles upon which they are based, no difficulty will, I apprehend, be experienced in conquering what might otherwise prove a rather formidable array.

Our immediate subject is, of course, *notions* or *terms;* for we must obviously possess a certain number of ideas (logically, *terms*), before it would be possible for us to make any attempt whatever at a train of thought or reasoning. Accordingly, it might be considered necessary that I should in the first place examine the question as to whether ideas are coeval with the mind itself, or whether they are the results of experience: but, were I to do this, I should quit the domains of Logic for those of metaphysics. Suffice it, therefore, if I describe the manner in which we obtain *certainly many* of our ideas, and *possibly all.*

§ 1. *Simple-apprehension.*

When any object is presented to the mind; and the attention is directed to it, a certain mental impression is produced, unintelligible indeed as to its nature, but the result of which

is that the object is recognised when again observed. That is to say, an *idea* is formed in the mind of that combination of properties and appearances which revealed itself to the senses upon inspection. Such an idea is termed an *intuition*, or *singular-representation*, and evidently can only refer to an individual object. It is also necessary for purposes of intercommunication, that names should be given to these several intuitions, and these names are called *singular-terms;* such, for example, are, "London, France, Charles, Bucephalus."

Now it is evident that if a separate personal name were to be bestowed upon each object, great confusion would result; and as in the majority of cases it is by no means essential that, when speaking of an object, reference should be made to some particular individual, it would speedily be found necessary to assign certain *class-names*, under which a number of similar objects might be grouped. This, accordingly, is done in the following manner.

Suppose a great many individual books had come under our notice, and we wished to be able to recall at pleasure the general idea produced by any one of them, without, however, mentioning it by name. In the first place we should compare several together, and ascertain the points in which they resembled, and differed from each other; thus, we should perceive that some were illustrated and others not; that one related to biography, another to history, and a third to mathematics; that there were many gradations of size and bulk; that they were bound in various styles; but also that every one of them agreed in possessing certain definite properties. These properties we should then proceed to abstract or separate from those qualities wherein the volumes differed; and, combining the former into one idea, we should be able to conceive of a class of things, each member of which would contain in itself all those *marks* or *attributes* which we had selected as essential to the idea in question. Finally, we should apply some name, in the present case "book," to the class thus imagined, and in this manner we should accomplish the object with which we had set out.

The process which has here been described is that of abstraction; it will be seen to consist of five steps, viz., com-

parison, or placing several objects together in order to judge of their resemblance; reflection, by which we decide upon the properties in which they agree or differ; abstraction, which enables us to form the points of resemblance into one idea complete in itself; generalisation, or the conception of a class whose members shall each contain (*inter alia*) this compound idea; and denomination, by means of which we impose a name for the purpose of recalling to our remembrance both the class and the idea; the names thus imposed, being known as *common terms; e.g.*, "sea, river, mountain."

Into these two classes, then, viz., singular and common representations, may all our notions be divided; and as that action of the mind which merely consists of forming an idea is termed simple-apprehension, so it is said to be *incomplex*-apprehension when we receive a notion of individuals without observing any relation between them, or *complex*-apprehension, when we perceive the existence of a class.

§ 2. *Abstraction of Common-notions*

The faculty of abstraction is possibly the most active and powerful with which the human mind is endowed; far from remaining quiescent when it has succeeded in forming a common-notion (or *conception* as distinguished from *intuition*) by the comparison of separate individuals, it instantly proceeds to repeat the process on a larger scale. This is done by treating a number of *classes* as so many individuals, and then—when their points of resemblance have been noted and combined into one idea—forming a higher class, which will include amongst its members all the former classes. Nor need we stop even here, for it is evident that no limit exists to the number of repetitions of such a proceeding, unless indeed there be a limit to the exercise of imagination itself.

Now every science arranges the subjects upon which it treats, in a perfectly similar manner, this being based upon the results of abstraction: accordingly, logicians have devised a certain scheme of names for this system, which we shall now explain.

A single object is called an *individual,* and comprehends within itself two distinct sets of marks or attributes; these are; first, that combination of qualities which we abstracted to form the idea of a class, and, secondly, such attributes as remain. Each of the former is termed a *property,* whilst the latter are called *accidents* or *differences;* the class of which the individual is a member being known as a *species.* This species, which is merely composed of individuals, is called the *lowest* or *infima species,* and the next higher class, being founded upon a consideration of infimæ species, is termed a *genus:* the latter name, however, is only applied when we contrast the higher class with the lower, for in the next stage of our conceptions we come to a yet wider genus, of which the previous genus is only a species. Thus we go on until we arrive at the most comprehensive class of all, which is accordingly named the *highest* or *summum genus,* and this, of course, can never be a species, for there is no higher class to include it. Every other genus is called a *subaltern genus,* being alternately a species and a genus.

An example of the above method of arrangement may be given as follows:—

Individual	Iron.
Infima species . . .	Metal.
Subaltern genus . .	Elementary substance.
Summum genus . .	Matter.

Accordingly, we can say that iron is a kind of metal; that a metal is a species of elementary substance; that an elementary substance is a genus of which metals are a species, or that an elementary substance is a species of matter.

It is, of course, quite clear that the precise details of the system, such as the question of what are to be considered as individuals, or where abstraction is to cease, must be left to the arbitrary regulations of each science: the only point here insisted upon being the fact that this system is employed in every pursuit which engages the human mind, thus showing decisively that thought proceeds according to certain fixed laws; which laws it is the province of Logic to explain.

§ 3. *Predicables, Extension, and Intension.*

We have already stated that "predication" is the affirming or denying one thing of another; thus, when I say "A is B," I am said to predicate B affirmatively of A, but were I to state that "A is not B," I should predicate B negatively of A. Now those notions or terms which may be predicated affirmatively of others are called "*predicables*," and must necessarily include a greater number of objects than the subjects of which they are predicated.* Thus, a species may always be predicated of an individual, or a genus of a species; and therefore, in accordance with the above-given example, we may say "iron is a metal," or "metals are elementary substances," but not "metals are iron," or "elementary substances are metals."

It will here be seen that in legitimate propositions, the subject contains within itself not only the whole of the marks or attributes which collectively form the predicate, but also an additional series of qualities. For instance, "iron" contains the common-notion of a "metal," together with those peculiar marks which enable us to distinguish it from other metals: accordingly, there is a greater number of marks or attributes in the subject than in the predicate, and this kind of comprehensiveness is called the *intension* of a term. But, on the other hand, we see that the predicate embraces a much larger number of objects than the subject, as a "metal" not only includes everything that is "iron," but multitudes of other things besides, such as "gold, silver," &c.; and this species of capacity is known as the *extension* of a term. Consequently, a term used in extension comprises only the specific properties of a body; and as it is, therefore, more general and less distinctive, it may always be predicated of a term used in intension, which consists both of properties and of accidents.†

§ 4. *Division of a Common-notion.*

If we are desirous of completely understanding any subject, it is very necessary for us to examine it closely, and the

* Here, of course, I allude to common-terms, for a singular-term can never be predicated of anything but itself; *e.g.*, we can say "John is John," but not "a man (*i.e.*, every man) is John."

† See page 17.

mental process by which we perform this is what I shall now consider. It is, in logical language, termed *division*, and consists in viewing every general idea as composed of two main sections, viz., the several members or parts of the idea, and the tie which connects them together. We then place the various parts in regular symmetrical order, such as is best adapted to their mode of union, and thus we are enabled to study each object separately, both as regards its own individual features, and its relations to the other members of the system.

Now the "tie" or "mode of union" which has been here alluded to, is altogether arbitrary, and depends upon the purpose which we have in view when entering upon the study of any subject. Take, for example, the science of natural history: Aristotle, looking upon the blood as the grand basis of the phenomena of life, divided all animals into two great classes, one possessing colourless and the other red blood, which done, he proceeded to describe the individuals forming these classes; Cuvier, on the contrary, adopted the bony skeleton as his guide in the arrangement of the various forms of life; while Rymer Jones, Vogt, and Siebold have respectively chosen the nervous system, the phenomena of development, and the relative complexity of organisation, as keys wherewith to unlock the vast storehouse of nature.

But when we have in this manner set apart some portion of the subject as a general principle to which we must constantly adhere, it becomes necessary to separate the subject into as many parts as may be convenient. This is done by observing the marks in which one group or class of objects differs from another, and thus dividing the whole of the subject into a certain number of genera: each of these genera is then examined and similarly divided into lower genera; and so we go on until we can no longer discover any smaller groups in a class, but are compelled to enumerate the individuals of which it consists. Thus we arrive at a regular system of summum genus, subaltern genera, infima species, and individuals.

In order, however, that this process may be properly performed, logicians have laid down the following rules:—

1. The *whole* subject must be divided: that is to say, the various parts taken together must exactly equal the genus divided.
2. The division must be conducted according to some single, definite principle.
3. The parts must be quite distinct; no two containing any common object.

Thus, if we were studying architecture, and wished to obtain a correct idea of the class of objects which are termed buildings, we must discuss the whole of the subject, and not confine our attention to a few species, such as palaces and temples only. And then when commencing the division, we must proceed according to some settled principle, such as, for instance, "application," consistently with which we should form the different species of "private-dwelling-houses," "factories," "warehouses," "churches," &c., and therefore no confusion would result, for the third rule given above would remain uninfringed. But if we were to pursue a different plan, and to divide buildings indiscriminately into "palaces," "Doric," "Gothic," "prisons," &c., we should violate both of the latter rules, having employed two principles of division, viz., "style" and "application," in consequence of which the various classes would be intermingled, and no true division would be performed; for it is evident that some palaces might be Doric and others Gothic, &c. This error is termed *cross-division*, and is one of the most frequent sources of confusion and perplexity in discussion and argument.

§ 5. *Positive, Negative, and Privative Terms.*

In order to test a division as to whether it be perfect, logicians are accustomed to take each part separately, and examine the possibility of dividing the whole subject into *positive* and *privative* portions with reference to the selected part. Thus, suppose the subject "man" be divided according to the principle of "colour:" we should have the four species of "white-men," "black-men," "red-men," and "yellow-men." We then see that it is possible to also divide "man" into the two ideas or conceptions of "whitemen" and "non-whitemen," for black, red, and yellow may all be described as non-white.

In the same manner "man" may be divided into "black" and "non-black," "red" and "non-red," "yellow" and "non-yellow," and so at length we see that none of the classes intermingle with each other.

The term "white-men" is called *positive*, because it denotes that a certain view (white) is taken of the object (men), while the term "non-whitemen" is said to be *privative*, in consequence of its implying that such a view might be, and yet is not taken. If, on the other hand, it were impossible to form a certain notion of a subject, the term which implies this, such as, for instance, a "non-white negro," would be styled *negative*.

§ 6. *Definition.*

In the process of logical division it is evidently necessary that we should employ some means of precisely determining, first, the full extent of the subject to be divided, and then the respective capacities of the various parts or species: this we are enabled to do by the use of *definitions*, that is, certain expressions which describe an object or notion in such a manner that we are enabled to distinguish it from all others.

Now the act of forming these expressions is termed the process of definition, and consists in an enumeration of the various attributes composing a notion. As a notion, however, may be either singular or common, we are obliged to use two kinds of definition, one of which, *accidental-definition*, is applied to individuals, and consists of the specific name together with the accidents; while the other, *essential-definition*, being applied to classes, consists of the generic name, together with the specific difference. Thus, the Thames might be defined as "a river which flows through London," where "a river" is the name of the species, and "flowing through London" the accident which distinguishes the Thames from other rivers. Again, we may define light as "a species of motion affecting the optic nerves in such and such a manner," the genus being "motion," and "affecting the optic nerves" the difference which distinguishes light from other species of motion.

This latter kind of definition, consisting of the genus and

specific difference, is also termed *logical-definition*, in opposition to *physical-definition*, which enumerates such parts of the object as are *actually* separable: *e.g.*, the boiler, mechanism, &c., of a steam-engine. Some writers also include physical-definitions under the head of essential-definitions.

Various rules have from time to time been given by logicians for the purpose of securing correct definitions, and may be summed up as follows.

1. The definition must be of exactly the same extent as the object defined: that is to say, it must not be of too narrow or too wide an application. Thus, to define "gravity" as "a force which attracts bodies to the earth" would be too narrow, as not including the celestial attractions, and being only applicable to *terrestrial* gravity: to define it as "a force which attracts one body to another," would be too wide, in consequence of its including magnetic attraction, &c.

2. The definition must not contain anything beyond what is absolutely essential to the subject. For instance, it would be incorrect to say that a "man" is "an animal endowed with the faculty of speech *and with life*," as it might then be supposed that the existence of an animal with speech, but lifeless, was possible.

3. The definition must be plainer than its subject, and must not be a repetition of the same term: *e.g.*, the explanation that "a metal" is "a metallic substance," would be no definition at all, while to assert that it is "a product of Plutonic action" is equally unsatisfactory.

§ 7. *Names and their Divisions.*

We have already seen that when an idea or conception is gained of any object or class of objects, some name is immediately attached to it, for the purpose of recalling the impression at any future time. It now remains to describe the various species into which these names are divided for logical purposes.

1. Making a division according to logical quality, we find that all names or terms may be divided into *positive*, *privative*, and *negative*, which have been described above. Positive terms, however, are also called *definite*, from their distinctly

defining an object; while for the reverse reason privative and negative terms are styled *indefinite*.

2. Names, as regards the method of using them, are either *univocal*, *equivocal*, or *analogous*; that is to say, some have only one meaning, such as "book," "sofa;" others have several meanings, such as "light," which signifies either the contrary of "heavy," or a physical force; while others, again, are extended from one object to another in consequence of some similarity—thus, "tongue" may be applied either to the body or to a piece of land.

3. Viewed as to their mutual dependence, terms are *absolute* or *relative*. The former appellation is bestowed upon those terms which are considered by themselves as a whole; the latter belongs to those which form part of a more complex idea. For example, the term "man" would be absolute; while *plaintiff* would be relative, as being a portion only of the idea plaintiff-and-defendant. It will therefore be seen that relative terms exist in pairs, and cannot be applied to the same object, as then they would be what is called *opposite*, to distinguish them from *compatible* terms, as those are named which may be so applied.

Correlatives is a name given to each pair of relative terms, and implies their mutual connection.

4. Terms are either *concrete* or *abstract*, according as they imply a notion together with the object furnishing the notion, or the notion by itself. Thus "fluid" is a concrete, "fluidity" an abstract term.

Also when the terms employed are common terms, or the names of classes, a further distinction will be observed. Take, for example, the concrete term "fluid;" it is evident that there is here implied a substance possessing certain attributes; accordingly, such a term is called *attributive*, or *connotative*, because it *connotes* some attributes together with the object. Again, the abstract term "fluidity" is, in like manner, named *absolute*, or *non-connotative*, from its merely denoting an attribute and nothing beyond.

§ 8. *Opposition of Terms.*

There is said to be a *contradiction in terms*, or two terms

are said to be in *contradictory opposition* to one another, when the only difference between them consists in the respective presence and absence of a negative particle; this difference enabling us to apply them universally. Thus, everything must be either "living" or "not living," "red" or "not red," &c.

When, however, two terms differing as to the same idea cannot be both applied to the same object, and yet there are some objects to which neither can be applied, such terms are said to be in *contrary opposition* to one another: *e.g.*, a man is not at the same time "walking" and "running," but a tree does neither.

§ 9. *Structure of Terms.*

An idea or term is expressed by a word or words; thus, "man," "horse," "steam-engine," "the Emperor of Russia," and such words as can be used *alone* to represent a term, are called *categorematic;* while all others are denominated *syncategorematic.* Sometimes, however, we meet with a single word apparently filling the place of a term, but for which it is necessary to substitute some other expression before its full import is conveyed. Take, for example, the sentence "He loves;" this, if reduced to logical form, would be "He is a person who loves."

§ 10. *Conclusion and Recapitulation.*

We have now reached the end of our investigation into the first great division of Logic, and before we proceed any further, it will be well for us to cast a brief glance backwards, and fully comprehend the connection which exists between the subjects just discussed, and those to come.

The course, then, of our investigations has been first to analyse the method in which we gain and record the impressions or ideas produced by the various objects which attract our attention: in doing this we found that all our ideas are either of individuals or of classes, the former being the result of incomplex-apprehension, the latter of complex-apprehension, which consists of the five processes of comparison, reflection, abstraction, generalisation, and deno-

mination. In the next place we examined the mode of arranging and classifying our ideas by the abstraction and division of conceptions (common-notions): this led us to perceive that the subject of a proposition embraces more marks or attributes than the predicate, while the predicate comprehends a greater number of objects; that is to say, the subject has the greater intension, the predicate the greater extension. We then showed how a logical division might be tested by the use of positive and privative terms, which done, it became our duty to describe the process of definition, and to explain the various rules which have been laid down for the purpose of securing correct results. Finally, we enumerated the divisions of the various names which have been bestowed upon ideas, and concluded by noticing the opposition and structure of terms.

It will of course be understood that in order to form an idea, it is not necessary that a tangible, corporeal object should be presented to the senses, for we have many notions to which there exists no corresponding reality: such, for example, are our ideas of justice, honesty, &c. In fact it may be said that no common-notion whatever has any existence out of our own minds; the conception of "man" for instance being merely that of a combination of marks or attributes which are never found separately by themselves, but are always united to other objects. Thus it is certainly true that the idea "*man*" has no *isolated* existence, but still it cannot be denied to *exist*, simply because it does so in conjunction with something else.

This question, here touched upon, is the celebrated bone of contention between the schools of the nominalists and the realists, the former following Abelard, and denying that common-notions (or universals) are anything more than mere names, while the latter, under the guidance of Plato, strongly affirmed the reality of their existence. The days of the schoolmen was the time when this controversy grew most warm, and such was the importance attached to the subject, that kings and popes did not scruple to exert their utmost power in the attempt to secure the triumph of the sect which they respectively patronised. But this by the way.

Now when the mind has once become supplied with ideas, it is enabled to reflect, the result of which is the formation of certain judgments. These judgments, when formally stated, are termed in logical language *propositions;* and, accordingly, the subject of our next chapter will be an examination of their origin and nature.

CHAPTER III.

OF JUDGMENTS OR PROPOSITIONS.

§ 1. *Formation of Judgments.*

Judgment is the act of determining by comparison whether one idea is or is not included within another; that is to say, it ascertains whether an individual belongs to a certain species, or a species to some genus. Archbishop Thomson has defined it as "an attempt to reduce to unity two cognitions." He says, "When one decides that 'Socrates is wise,' it is that hereafter one may, by combining the two notions, think of 'the wise Socrates.'" Now it is by no means evident that the two cognitions are here attempted to be reduced to *unity*, for no person would surely expect to render them so inseparable, that whenever the idea of "wisdom" presented itself to his mind it should be invariably accompanied by the notion of "Socrates." In fact the judgment that "Socrates is wise," is merely an assertion that "Socrates belongs to the class or species of wise men," or "Socrates possesses wisdom," thus enabling us to fix his place more exactly in our system of ideas.*

Accordingly, it will be seen that judgment is the result of that mental faculty which so strongly impels us to classify and arrange the various notions with which our senses provide us, so that we may the more clearly comprehend the various dependencies and relations by which they are connected together into one harmonious whole. We have already considered three portions of this faculty, viz., abstraction, division, and definition; it now remains to consider judgment, without which none of these processes could be conducted.

* For further information upon this point, see Appendix A.

And here it might well be asked whether, if the formation of common-notions is the result of judgment, a judgment also in its turn is not the result of reasoning—for we have already seen that the conclusion of a syllogism is a judgment or proposition. This question, however, belonging as it does to metaphysics, cannot be satisfactorily answered in the present place; and, therefore, I shall at once proceed to discuss the nature and *proximate* origin of propositions, without minutely investigating their remote ancestry.

§ 2. *Categorical Propositions.*

A categorical judgment or proposition is an assertion that one idea agrees or disagrees with another, and consists of three parts—the *subject* or idea under examination; the *predicate*, or idea to which the subject is referred; and the *copula*, which determines the relation between them. Thus, in the proposition "lions are animals," the subject is "lions," and is connected to the predicate "animals," by the copula "are," which implies that "lions" form a species of the genus "animal." This judgment results from our having compared the two ideas with a view to ascertain whether the attributes of "animal" were contained in "lion."

The subject and predicate of a proposition, may of course be infinitely varied, since there is no limit to the number of ideas; but the copula always remains the same, being either "is," or "is not," or their equivalents. And here it may be remarked that the word "is" signifies, when employed in a proposition, the *identicality* of the subject and predicate, such *identicality* being, however, *limited* by the form of the proposition. The subject and predicate are also called the terms of the proposition, as they form its boundaries or terminations.

Categorical propositions are divided into *pure* and *modal*—the former being cases where the subject is *directly* asserted to agree or disagree with the predicate; the latter where the subject is said to agree or disagree with the predicate *in some particular manner*. For instance, "The sea is rough;" "He addressed the people;" are both pure, but "The sea is terribly rough;" "He addressed the people good humouredly;" are modal. This distinction is, however, of no use for logical pur-

poses, since we may always treat modal propositions as being pure, by simply attaching the *mode* to either the subject or the predicate: thus, in the example above given, "terribly rough" must be taken for the predicate.

§ 3. *Hypothetical or Conditional Propositions.*

All judgments are not formed by a comparison of existing notions, for it is possible to decide upon the mutual relation of two assumed conditions of things. Accordingly, we meet with a class of propositions termed *hypothetical*, or *conditional*, whose assertions are subject to a certain *condition:* of this kind are such sentences as the following—"If the results of geological science are trustworthy, the earth has existed for countless ages." "If you do this well, you shall be rewarded."

Hypothetical propositions are not, however, to be considered as different in nature from categoricals, for both species of judgment result from precisely the same operation of the mind. This will be clearly seen if we examine one of the instances given above, and ascertain what it is that we really assert. Taking the first example, it is evident that we decide nothing as to the results of geological science, or as to the earth, but we say that the assuming those results to be trustworthy would necessitate our granting the earth to be of the age stated. This judgment, then, may be expressed as follows, viz., "The case or supposition of the results of geological science being trustworthy, is a case or supposition of the earth having existed for countless ages"—where the subject, copula, and predicate of a categorical proposition will be at once recognised.

§ 4. *Disjunctive or Alternative Propositions.*

There is yet another form which our judgments may assume, this being the statement of some alternative, such as, "Either Tyndall is wrong, or mechanical force produces heat;"—which, accordingly, is known as a *disjunctive* or *alternative* proposition. To show its harmony with the forms already discussed, we have only to remark that it may be converted at will into a hypothetical, as, "If Tyndall is not

wrong, mechanical force produces heat;"—or into a categorical, thus: "The case of Tyndall being wrong, and the case of mechanical force producing heat, are all the cases possible."

As regards hypotheticals and disjunctives considered apart from categoricals, we shall have more to say when we come to discuss the treatment of arguments where they occur; at present, however, we are concerned altogether with pure categoricals, having shown that all propositions whatever may be regarded as such.

§ 5. *Quantity of Propositions.*

As we have no ideas beyond those of individuals and of classes, our judgments must always be concerning intuitions (singular-notions), or conceptions (common-notions). Now a singular-notion being indivisible, we must invariably treat of the whole of it; but as regards common-notions, we are able to discuss either a part or the whole. This distinction has enabled logicians to divide all propositions according to *quantity;* that is to say, according to the extent of their subjects: and, therefore, whenever the subject is a singular-notion, as, "John is rich,"—or the whole of a common-notion, as, "*All* metals are conductors of heat,"—the proposition is called *universal;* but if only part of a common-notion be employed for a subject, as, "*Some* metals are lighter than water," then it is termed *particular.*

§ 6. *Quality of Propositions.*

Another division of propositions is according to the signification of the copula, which is termed the *quality* of a judgment, and as this must be either affirmation or negation ("is" or "is not"), so propositions are styled *affirmative* or *negative,* according as they respectively express the agreement or disagreement of subject and predicate. Thus, "The whale is a mammifer" is an affirmative proposition; while "No alloy of ammonium is stable" is negative.

It must here be remarked that a negative sign may occur in a proposition, and yet not belong to the copula; in such a case the proposition is affirmative. Take, for example, this

judgment, "Not to accept the offer is great folly," and we see that the "non-acceptance" and "great folly" are declared to agree with each other.

§ 7. *Distribution of Terms.*

Whenever in a judgment a term is used in its full sense—that is to say, as comprehending every single object that it could possibly include—it is said to be *distributed:* accordingly, every universal proposition distributes its subject, but particulars do not. When, however, we examine into the distribution or non-distribution of the predicate, we find that this depends not on the quantity, but upon the *quality* of the proposition. Thus in negative judgments it will be seen that the *whole* of the predicate is declared to disagree with the subject; as, for instance, in the following proposition, "No negro kingdom is civilised," where the entire idea of "civilisation" is pronounced to be incompatible with the idea of "negro kingdoms." But in affirmative judgments the case is different, as we can only infer from the form of the expression, that a *part* of the predicate is implied. Thus, knowing that one *portion* of the genus "animal" is composed of "horses," or in other words, that the attributes forming the idea of "animal" is to be found in every horse, we can say correctly that "horses are animals." Here, then, the predicate is not distributed.

Consequently, we arrive at these two rules:—

1. The subject is distributed in universal, but not in particular propositions.
2. The predicate is distributed in negative, but not in affirmative propositions.

The latter rule is, however, subject to three exceptions; first, when in an affirmative proposition the predicate is a singular notion and is consequently distributed, for we cannot think of a part only of an *intuition;* secondly, when some expression is employed which indicates that the *whole* of the common-notion forming the predicate is compared with the subject. Thus, in both of the propositions, "Davy was the discoverer of potassium," and "These fragments are all that

remain,"—the predicate is distributed. The third exception is to be found in negative propositions, where the predicate is qualified in such a manner as to indicate that *part* only of its signification is employed. This will be observed in such sentences as "Steam-engines are not *some* machines;" "No men are *some* created beings;"—which import respectively that some machines are not steam-engines, and that some created beings are not men. These latter propositions are termed *partial-negatives*, those to which the rule applies being styled *total-negatives*.

§ 8. *Relation of Terms.*

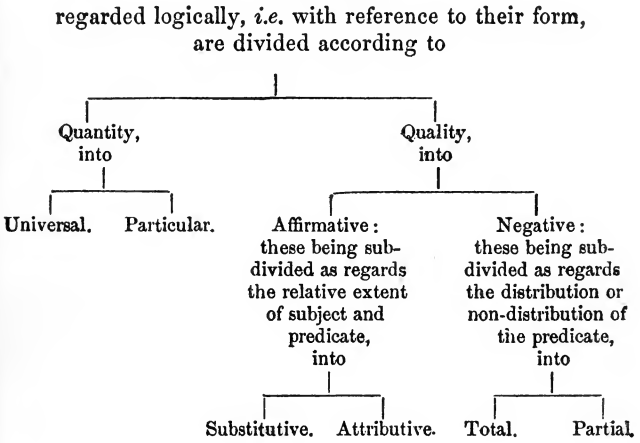
We have already stated that judgment is the act of determining by comparison, whether one idea is or is not included within another. In doing this we find some cases where the notions are of equal extent, such as the various intuitions produced by the same object under different circumstances, or those conceptions which comprise the same individuals. This fact we express in the *form* of the proposition, which consequently indicates that it is the result as it were of *two* judgments, the one having ascertained that the subject of thought belonged to a certain class, while the other determined that it was co-extensive with the class. Such propositions are those mentioned above as constituting exceptions to the rule which declares that no affirmative proposition distributes the predicate.

Now in consequence of this relation, it follows that we may indifferently affirm the predicate of the subject, or the subject of the predicate. Thus it matters not whether we say "Davy was the discoverer of potassium," or "The discoverer of potassium was Davy;" or again, whether we say, "These fragments are all (the fragments) that remain," or "All the fragments that remain are these (fragments)." Accordingly, such propositions are termed *substitutive*, from our being able to employ subject and predicate as substitutes for each other.

All other affirmative propositions have their predicates non-distributed, and merely import that these may be attributed to, and not substituted for, the subjects. On this account they are styled *attributive*.

§ 9. *Systematic Classification of Propositions.*

Having now given a full description of the various divisions and subdivisions of propositions, it will be well to give a short summary of the system. This is best done by the use of a "scheme," as follows:—


Propositions
regarded logically, *i.e.* with reference to their form, are divided according to
Quantity, into
Quality, into
Universal.
Particular.
Affirmative: these being subdivided as regards the relative extent of subject and predicate, into
Negative: these being subdivided as regards the distribution or non-distribution of the predicate, into
Substitutive.
Attributive.
Total.
Partial.

§ 10. *Table of Possible Propositions.*

We see by the above scheme, that propositions are of four great classes, affirmative-substitutive, affirmative-attributive, total-negative, and partial-negative. Each of these may be again subdivided into universal and particular, so that altogether there are eight possible kinds of judgment or predication. The names of these propositions, however, being too long and cumbersome for constant repetition, logicians have adopted certain letters to serve as symbols for these names, and in the following table will be found a list of all possible propositions, together with their respective symbols, and illustrative judgments; the subject and predicate in each being represented by the letters X and Y.

Name.	Example.	Symbol.
Univ. Affirm. Substi.	All X is all Y.	U.
Univ. Affirm. Attrib.	All X is some Y.	A.
Univ. Total Neg.	No X is Y.	E.
Univ. Partial Neg.	No X is some Y.	η.
Part. Affirm. Substi.	Some X is all Y.	Y.
Part. Affirm. Attrib.	Some X is some Y.	I.
Part. Total Neg.	Some X is no Y.	O.
Part. Partial Neg.	Some X is not some Y.	ω.

In this table there are two propositions which, as being of little practical importance, we may leave out of our future consideration. I allude to those whose symbols are η and ω; the reason of their inutility being as follows. When we say "no men are some animals" (η), we mean "some animals are not men" (O), which latter, being a much more forcible and convenient mode of expression, is usually adopted. Also when we say "some men are not some animals" (ω), the power of negation is still less, for there is nothing to prevent us saying at the same time "some men *are* some animals."

Accordingly, I shall confine my future remarks to the six kinds of judgment, U, A, E, Y, I, and O, and when the student is able to treat arguments involving these, he will find very little difficulty in disposing of those rare cases in which η and ω may occur.

§ 11. *Interpretation of the Copula.*

The copula, as already stated (§ 2), signifies a certain identicality of the subject and predicate. This identicality, however, may be considered from several points of view, according to the purpose we have in hand. Thus, if we were engaged in determining the intension of the notion "fluids," *i.e.* in ascertaining what were its marks or attributes, and we were to form this judgment, "All fluids are compressible," we should mean that fluids were contained in the class of compressible substances, *in virtue of one of their attributes being compressibility*. But if we were chiefly desirous to fix the relative extent of the terms, *i.e.* to determine their extension, we should only care to imply by the above expression that *the class of compressible substances included amongst other things the class of fluids.*

It will, however, be observed that these are not two *different meanings* of the proposition, but merely *two different modes of regarding the same meaning.*

Another method of interpreting the copula, or connection between subject and predicate, has been suggested. This consists in viewing the judgment as regards its *denomination*, *i.e.* in considering it as implying that the predicate may be given as a name to each of the objects contained in the subject. The example stated above, if interpreted in this manner, would be held to imply that the name "compressible" might be given to every fluid.

§ 12. *On some other Properties of Judgments.*

It is impossible for us to form a *complete* idea of any object, as we are unable ever to ascertain the whole of its various marks or attributes. Accordingly, we observe continually some new feature, and this it is which causes us to make so many fresh judgments. At the same time there always exists a certain set of marks which are almost inseparably connected in our minds with respective ideas; so that it is scarcely possible to recall these ideas without at the same time recalling those attributes. Take, for example, the case of material bodies; we cannot think of any, without also thinking of shape and extension, two properties of matter.

Upon these considerations, metaphysicians, and after them, logicians, are occasionally accustomed to consider judgments with reference to their bearing upon our knowledge of the subject. If they increase our information, such as those which result from our discovery of some new attribute, they are termed *ampliative.* If they add nothing to what we really know, they are called *explicative* when they are in a measure explanatory of the subject by predicating some closely-connected attribute; or *tautologous*, when the predicate is identical with the subject, such as, "A man's a man."

§ 13. *Concluding Remarks.*

In the present chapter we have taken the subject of "judgments," for logical investigation, and the result of our studies may be summarised as follows.

Judgment is the act of determining the agreement or disagreement of two notions, and when its result is expressed in words, it forms a sentence which is termed a proposition. Propositions may be stated categorically, such as "A is B," or "A is probably B," the former being *pure*, the latter *modal*: hypothetically, such as "if A is B, C is D:" or disjunctively, such as "either A is B, or C is D." All propositions may, however, be reduced at pleasure to a pure categorical form. Accordingly, in a systematic account of judgments, reference is made exclusively to pure categoricals, concerning which there are four great doctrines. The first is of quantity, and divides all propositions into universal or particular, according to the respective extent of their subjects. The second is of quality, and divides all propositions into affirmative or negative, according to the import of their copulæ. The third is of distribution, and determines in what cases the various terms are employed as wholes or parts, *i.e.*, whether they are distributed or non-distributed. The fourth is of relation, and arranges all propositions according to the extent of their predicates; affirmatives being divided into substitutives and attributives, and negatives into total and partial. From this classification it results that there are eight different kinds of propositions, each being for the convenience of logicians distinguished by an arbitrary symbol. Two, however, of these species may be dispensed with as being of little practical importance; and, therefore, only the remaining six need be dwelt upon in future. Judgments may also be viewed as regards the significance of their import, which varies with the method of interpretation. Thus, they may be considered with reference to their intension, or attributes of the subject; extension or relative capacity of the predicate; denomination, or applying the predicate as a name to each member of the subject; or, finally, with reference to their bearing upon our knowledge, according to which they are ampliative, or informing; explicative, or explanatory; tautologous, or useless.

We are, therefore, now in a position to enter upon the investigation of a most important and interesting topic—the formation of new judgments from a consideration of some

already existent. This process, termed reasoning, is as it were, the very climax of logical science, and illustrates the use of our preceding reflections upon terms and judgments. Its study is, however, far from being difficult when orderly arranged, and is calculated to induce the most pleasing emotions in the mind of any person who has attentively pursued it, and has observed the singular simplicity and harmony with which the mind works. In fact, we have already had some remarkable instances of this, for we have discovered that the vast, nay infinite world of ideas—than which nothing can be more varied and diverse—may be referred to a few simple processes of the intellect, and may be grouped together into a system of surprising lucidity. The same thing occurs with our innumerable judgments, which, though outwardly dissimilar and confused, are found to be all constructed on the same plan, and to be capable of arrangement in orderly sequence and regularity.

Accordingly, to him who zealously strives after a complete understanding of these facts, there accrues an elevation of the mind such as cannot otherwise be attained. That grand principle of systematic grouping which underlies all his capacities of acquiring knowledge, is roused into vigorous and healthy exercise; his powers of observation, or rather, his capabilities of impression by outward objects, are greatly increased; and, while he is charmed by the stately vista of theoretical truth which reveals itself before him, he is at the same time conscious that his toils have not been unfruitful in practical results.

CHAPTER IV.

OF REASONING OR ARGUMENT. SYLLOGISMS.

§ 1. *Reasoning in General.*

THE desire of the mind for knowledge admits of no satiety: vast though its acquisitions may be, the pursuit is in nowise slackened; and the regions of infinity itself oft yield rich spoils to some aspiring intellect, which, thirsting for new worlds to conquer, has striven to investigate the most mysterious recesses of the universe. This fact is proclaimed in every page of the world's history: the speculations of the philosopher, the actions of the statesman, the harmonious breathings of the poet, all alike bear witness that the watch-word "progress" is stamped indelibly upon the human mind. If, then, we consider that in our souls there is implanted a faculty which irresistibly carries us forward to the acquirement of new truths, we shall not be surprised when we discover that there are also implanted certain natural laws, which serve to control and guide that faculty in the manner best adapted for the attainment of its ends. Accordingly, since these laws exist, and are the same in all minds, it results that the method of acquiring knowledge is identical in every case.

Now, information may be obtained in three different ways: by the presentment to our minds of the various objects of thought, thus inducing the formation of ideas; by the comparison of ideas, which enables us to make judgments; and by the comparison of judgments for the purpose of arriving at some new truth. The two former of these processes have hitherto engaged our attention exclusively; we have therefore now to investigate the latter, which, of all the mind's

actions, challenges our observation in the most marked manner.

Reasoning, then, consists in arriving at some new truth, from a consideration of other truths already established. These truths it is evident may be expressed in numberless ways, as also may the truth to be inferred; but whenever an act of reasoning is put into words, it will always be found possible to separate it into two portions, one expressing some admitted truths, the other some truth resulting from them. Thus the mere arrangement of the argument (as an act of reasoning when expressed in words is termed) matters nothing with regard to the principles involved; and, consequently, in spite of these principles being, as above stated, universal, we everywhere find that reasoning is expressed in whatever manner may be suggested by the circumstances of the case. This it is, which has led to such erroneous opinions as to the true office and nature of Logic; men, distinguished in other respects for their prodigious intellectual power (*e.g.* Locke), having imagined that because Logic alters the loose, popular *arrangement* of arguments, into a form better adapted for elucidating the principles concerned, it therefore is occupied in teaching some particular *method* of reasoning, the laws of which are different to those employed by such as have not studied the science.

§ 2. *Syllogisms. Inference.*

From the preceding remarks it will have been gathered that before entering upon a logical investigation of any act of reasoning, it is necessary that this should be expressed in a certain regular form. Such forms are termed *syllogisms*, and are so constructed as to show the validity of the argument, without any reference to its *matter*, *i.e.*, to the subjects of which it treats: that is to say, the mere manner of expression is such that the new truth, or *conclusion*, is at once seen to be legitimately deduced from the truths already granted, viz., the *premises*.

The act of thus deducing the conclusion from the premises is termed inference, and consists in ascertaining the full purport of the premises. Thus, ascertaining that chlorine is a

gas, and knowing that all gases are elastic, I infer, or conclude that chlorine is elastic. If expressed in logical form, the argument would run thus: "All gases are elastic; chlorine is a gas; therefore chlorine is elastic." It is not, however, always the case that we commence our reflections with the premises, for we frequently first consider the conclusion, under the guise of a question or problem. For instance, suppose in the above case that we wished to know whether chlorine was elastic or not: we might ascertain the truth by examining the substance; and, finding it to be a gas, we should be certain that it was elastic, as previous investigations had decided that all gases were so. Here we see that there are two terms, "chlorine," and "elastic," the agreement or disagreement of which, we were enabled to decide upon by finding some third term, "gas," wherewith they might be respectively compared. This third term is called the *middle* term, and is the very essence of the syllogism; the inference connected with it being accordingly termed syllogistic, or *mediate* inference.

We now arrive at a somewhat interesting question, viz., whether there can be any kind of reasoning other than mediate inference; that is to say, can we from *one* judgment or truth only, *directly* infer some other? Some writers have contended that such a thing is possible, and have accordingly described a species of reasoning which they term *immediate* inference. Others have denied the possibility of this, and assert that in the examples adduced by their opponents, there is no inference or reasoning whatever.

Now the truth would appear to be that the disputed cases are in reality certain examples of *mediate* inference, which possess such strongly marked peculiarities as to distinguish them from all other instances of reasoning, and to lead to the belief that the laws upon which they are constructed differ from those of the regular syllogism.

It will, therefore, be well to consider these arguments apart from the great bulk of reasonings, more especially as owing to the above mentioned views being adopted, logicians have devised rules for the treatment of such cases, to which rules both parties agree. The arguments themselves may be

classed under three great heads or doctrines, viz., *opposition*, *conversion*, and *coincident junction:* these I shall now proceed to investigate, showing in each case the real nature of the argument.

§ 3. *Opposition.*

The relation which exists between any two propositions differing in form, but identical in matter, is termed opposition. Thus, the judgments "All fishes swim," and "No fishes swim," agree as regards their matter, *i.e.*, their subjects and predicates are respectively formed by the same notions; but they differ with respect to form, one being A, or universal-affirmative-attributive, while the other is E, or universal-total-negative: they are accordingly said to be opposed. And here it should be remarked, that in order for opposition to exist, the respective subjects and predicates must, in both propositions, be considered with reference to the same ideas, time, and circumstances. Thus, I might say, "This man is happy," and "This man is not happy," with perfect truth, providing I were alluding to his condition at separate times; but otherwise, the judgments would be opposed to each other.

The doctrine of opposition is based upon an examination of the various forms of propositions, and declares the natural laws which regulate their mutual relations. Take, for example, a proposition in E, "No metals are vaporisable." On analysing this, we arrive at the following results: that the proposition asserts the total exclusion of the class "metals" from the class of "vaporisable substances;" that—since from the nature of things we know there must always be either a total exclusion, or partial inclusion at least of one class in another—accordingly, if the proposition be true, any judgment which asserted an inclusion (even if only partial) of "metals" within "vaporisable substances," would be false; while if the proposition were not true, a judgment of partial inclusion, at any rate, must be correct. The rule, then, that we should deduce from such an examination would be, "Either E or I must be true;" this, when required for formal use, being converted into its equivalent categorical propositions, "The case of E being false, is a case of I being true;" and "the case of I being false,

is a case of E being true." Taking the example given above, we have for the complete syllogism,

The case of E being false is a case of I being true,
The present is a case of E ("no metals are vaporisable") being false;
∴ The present is a case of I ("Some metals are vaporisable") being true.

In logical language, when we assert the truth of any proposition, we are said to *posit* it; when we deny its truth, we *remove* it. Consequently the above rule is thus technically expressed, "From the position of E we may infer the removal of I; from the removal of E we may infer the position of I; and, in both cases, *vice versâ*." The relation thus declared to subsist between E and I, is called contradictory-opposition, and E and I are termed the contradictories of each other.

I have now I trust shown, once for all, that the inference which obtains in cases of opposition, is *mediate*, and may be regularly expressed in the syllogistic form. I shall, therefore, in recounting the remaining kinds of opposition, merely give the usual logical rules for the position and removal of propositions, without discussing their bases, as the student will be able to do this for himself, by following the method of procedure adopted above.*

There are four kinds of opposition: contradictory, contrary, subaltern, and subcontrary.

Contradictory opposition exists only between E and I, although those writers who do not recognise U and Y, describe it as also existing between A and O. The rule of this opposition is, "The position of a judgment infers the removal of its contradictory; the removal of a judgment infers the position of its contradictory." It has been fully explained above.

Contrary opposition exists between those pairs of judgments which may be false together, but cannot at the same time be true. These are A and E, A and U, A and O, A and Y, U and Y, U and O, E and U, and E and Y. The rule is, "The position of a judgment infers the removal of its contrary." Nothing, however, follows from the removal of a judgment. Thus, "All whales are warm-blooded," and "Some

* For further remarks upon this subject see Appendix B.

whales are not warm-blooded," are contraries (A and O): if we admit the former, we must deny the latter, but if we deny the latter, we are in doubt whether to say, "All whales are all the warm-blooded (things)" (U), or, "All whales are (some) warm-blooded" (A).

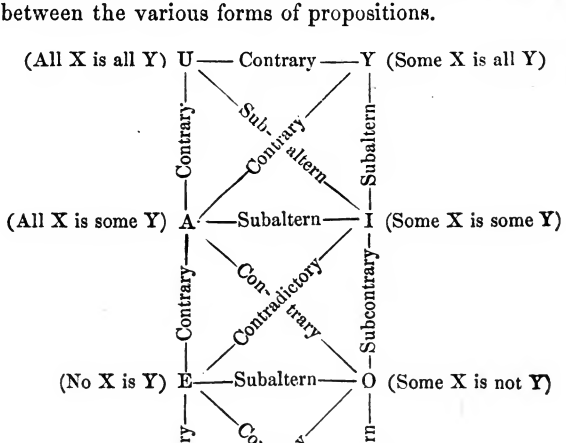
Subaltern opposition exists between certain pairs of judgments which may be true or false together, viz., A and I, U and I, Y and I, E and O, and Y and O. In these cases, that judgment which has most distribution in its terms is called the *subalternant*, its opposite being styled the *subalternate*. Thus I is subalternate to A, U, and Y, while O is so to E and Y. The rule here is that, "The position of the subalternant infers the position of the subalternate."

Subcontrary opposition exists between I and O, which may be true, but cannot be false together; accordingly, the rule in this case is, "The removal of a judgment infers the position of its subcontrary." Y and O have been termed subcontraries by Dr. Thomson, but they would rather appear to come under the head of subaltern opposition, where it will be observed that I have placed them.

It is proper to remark here that the word opposition does not in logical language imply an *incongruity* of two judgments, for we have just seen that there are some cases where opposed propositions may both be true at the same time; it is merely a name given to a certain *relation* existing between the various *forms* of judgments, such relation differentiating as the forms themselves differentiate. Therefore, when Sir William Hamilton states* that "there is no opposition between subcontraries," and that to say so "is a mistake," he appears to have been misled by grafting the ordinary sense of the word "opposition" upon its logical signification; for at a short distance previously we find him declaring opposition to be a relation existing between two judgments which are "opposed or *conflictive*." It is, however, somewhat strange that he should omit to take any notice of subaltern opposition as such, and content himself with merely mentioning it as a relation of subordination. He, it will thus be seen, admits of only two kinds of opposition—contradiction and contrariety.

* "Lectures on Logic," vol. i. p. 261.

It is generally the practice in logical works to give a figure or "scheme" of opposition; and, as this plan is useful in many respects, I subjoin the following, which shows at a glance the relations that have been described above as existing between the various forms of propositions.



§ 4. *Conversion.*

Conversion is the technical name applied to the operation of forming one judgment from another in such a manner that the subject and predicate of the original proposition (the *convertend*) shall be respectively the predicate and subject of the new one (the *converse*). Thus, "Some men of great imagination are all the good poets," is said to be the *converse* of "All good poets are men of great imagination."

Now it is evident that a process of inference takes place here :* let us, therefore, inquire into its nature.

The import of our first judgment is that the class of "good poets" is included, amongst other things, in the class

* See Appendix B.

of "men of great imagination;" and as we know from the natural laws of extension that when one thing is included in another, a part of the object including is equal to the whole of the object included,—we therefore see that in the present case it will be allowable to predicate the entire class of good poets," of "*some* men of great imagination." Accordingly, we frame a general judgment which may be applicable to all cases, and which runs thus, "A case of A is the case of the same subject and predicate being reversed and thrown into the form of Y."

The syllogism, then, will be as follows:—

A case of A is a case of Y containing the same terms as A, but reversed in position,

The present case ("all good poets," &c.) is a case of A;

∴ The present case is a case of "some men of great imagination are all good poets."

The general practice, however, with regard to conversion is the same as that pursued in reference to opposition: instead of framing a syllogism every time we wish to convert a proposition, we employ certain rules which enable us to perform the operation in a more speedy manner. These rules are:—

1. The quality of the converse must be the same as that of the convertend.
2. No terms must be distributed in the converse, but such as are distributed in the convertend.

If the above rules be adhered to, no difficulty need be experienced in converting any proposition whatever; but as a means of facilitating the process still more, the following table will be found useful.

U	may be converted into			U
A	,,	,,	,,	Y
E	,,	,,	,,	E
Y	,,	,,	,,	A
I	,,	,,	,,	I
O	,,	,,	,,	η
η	,,	,,	,,	O

One peculiarity of this table will be at once noticed by the student: I allude to the employment of the form η. This is necessitated by the consideration that if we follow the rules

just given, we can only convert O into η; it is, however, a conversion which is never likely to be made, for, as stated in a former part of this work (p. 34), O is "a much more forcible and convenient mode of expression" than η.

The above method of conversion may be termed *simple*-conversion, although this name is usually limited to the conversion of E and I; that of A being called conversion *per accidens*, or *by limitation*, in consequence of a particular proposition being educed from a universal; while O is treated as inconvertible.*

There is another process which is sometimes considered as a species of conversion, and which may well be examined in the present place. It is variously termed conversion by *equipollence*, by *contraposition*, by *negation*,† by *double negation*,‡ and *immediate inference by means of privative conceptions*; § the name which I shall employ will be *privative-conversion*, as this both indicates the nature of the process, and is harmoniously opposed to the term *simple conversion*.

The *modus operandi* of privative-conversion consists in changing the quality of the convertend, and altering its predicate into a corresponding positive or privative conception, according as the case may be. The reasoning process which forms the foundation of the doctrine is as follows. Take some proposition in A, as, "All intellectual men are amiable," and let us think what it is that we know about its terms: the judgment itself makes us aware that "intellectual men" are in the class of "amiable men," but gives us no further information regarding the latter class; we know, however,¶ that it is possible to form a conception which shall include every man not comprised under "amiable men," and that then we may deny the latter of the former: this we proceed to do, and say, "No amiable men are unamiable"—a judgment which supplies us with the desired premiss, and enables us to form a complete syllogism; thus:—

* Here it will be seen that I allude to those writers who only admit A, E, I, and O.

† Whately's "Elements," Book ii. chap. ii. § 4.

‡ Hamilton's "Logic," vol. ii. Appendix V. c. p. 267.

§ Thomson's "Outlines," § 86.

¶ Supra, p. 20.

No amiable men are unamiable,
All intellectual men are amiable;
∴ No intellectual men are unamiable.

This conclusion is the converse required, and is seen to fulfil all the conditions of privative-conversion; that is, its quality is changed, and its predicate is replaced by a corresponding privative-conception.

§ 5. *Coincident Junction.*

When one class is said to be comprised in another we mean that all the members of the former are also members of the latter. Accordingly, these members may be considered as objects which (*inter alia*) are composed of two sets of ideas inseparably connected. We cannot, therefore, add anything to one idea and not at the same time add it to the other: nor for the same reason can we add one of the ideas to anything, without also adding the other. These considerations supply the general principles of what may be termed the doctrine of *coincident-junction*, and which is thus expressed: "From any judgment we may form another by adding some marks equally to the subject and to the predicate; or we may add the subject and predicate as marks to some fresh conception." Thus if "a metal is a solid" be true, we may also infer that "a red metal is a red solid;" or if we admit that "Logic is the science of the laws of thought," we must equally admit that "the study of Logic is the study of the science of the laws of thought." The former of these inferences has been termed "immediate inference by added determinants;" the latter, "immediate inference by complex conceptions." It will, however, be readily seen from the above investigation of the principles involved, that these reasonings may be exhibited in the syllogistic form, as easily as any of the others.

This concludes the discussion of those arguments which are commonly styled immediate inferences; and, accordingly, whenever we have occasion to employ them in any future portion of this work, they will be considered as falling under their own special rules, and not as regular syllogisms. Such a course will be the more convenient as it will be more familiar to the student; for the general laws which constitute the third

propositions of such syllogisms as have been already considered, are so firmly fixed in our minds, that we are scarcely conscious of their existence, until our attention is specially directed to them; and, consequently, it may almost be said that they are never *overtly* employed in the eduction of so-called immediate inferences.

It will of course be understood that these arguments are not limited to a single operation; for it is possible to start with a judgment and successively employ the three processes of opposition, conversion, and coincident-junction, until we arrive at some other proposition which may satisfy our requirements. Such a proceeding is sometimes said to be merely a determination of a proposition's full signification; but this may be said in effect of all reasoning whatever, for "an *extension* of any science through Logic is absolutely impossible; as by conforming to logical canons we acquire no knowledge, receive nothing new, but are only enabled to render what is already obtained, more intelligible by analysis and arrangement."*

§ 6. *Mediate Inference formally expressed as such.—Its Divisions.*

When an act of reasoning is fully expressed in words, *i.e.*, if the three judgments be articulately stated, we have what is termed a syllogism. But as we saw, when treating upon propositions, that these are of three kinds, categorical, conditional, and disjunctive; so in like manner are syllogisms divided, according as they contain these respectively. Thus the syllogism, "All A is B; C is A; therefore C is B," is *categorical;* "If A is B, C is D; A is B; therefore C is D," is *conditional;* and, "Either A is B, or C is D; A is not B; therefore C is D," is disjunctive.

Now the two latter species of syllogisms may always be reduced to the former when occasion requires, and therefore an examination of the necessary laws of reasoning, together with the systematic arrangement induced by these laws, will best find place under the head of categorical syllogisms. Accordingly, in the following analysis, I shall speak simply of the

* Hamilton's "Logic," Lect. iii. p. 44.

arguments so denominated; this plan being consonant with that pursued when judgments were discussed.

§ 7. *The Fundamental Law of Mediate Inference.*

"Thought," says Sir W. Hamilton, "is the cognition of any mental object by another in which it is considered as included; in other words, thought is the knowledge of things under conceptions." This accords with what I have already stated concerning the grand principle of classification which underlies our faculties of acquiring knowledge; and prepares us to appreciate the fundamental law of mediate inference, which is as follows:—"*Whatever belongs or does not belong to the containing whole, belongs or does not belong to each and all of the contained parts.*"* This law, commonly called the "*dictum de omni et nullo*," we owe to the commanding genius of Aristotle, who first placed Logic upon a sound and durable basis. It is not, however, to be understood that this *dictum* is *directly* applicable to every case of reasoning; the assertion merely being that the validity of any argument is *ultimately* referable thereto.†

For practical purposes men seldom ascend to general and fundamental truths, but devise a system of rules which, being immediately applicable, may obviate much of the inconvenience and delay that would otherwise ensue. Hence it is that logicians have developed Aristotle's *dictum* into the following *proximate* canon. "If two notions agree either wholly or in part with one and the same third, they agree with each other; but if one of them is agreed and the other disagreed with the same third, they disagree with each other." This canon is, however, differentiated still further, thus:—

1. *A syllogism must contain three, and only three, terms, constituting three, and only three, propositions.* The force of this rule is at once evident when we consider that the object sought to be attained by syllogising, is to determine the agreement or disagreement of two notions by respectively comparing

* Hamilton's "Logic," Lect. xvii. p. 321.

† Some objections having been raised by Mr. Mill and others to this account of the fundamental law of mediate inference, I have discussed the question at greater length in article C of the Appendix.

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them with a third. This, of course, could not be done if we employed more or less than the three terms, or formed more or less than the three judgments.

The names of these terms depend upon their position in the syllogism. The predicate of the conclusion is called the *major* term; the subject of the conclusion is called the *minor* term; while the third notion with which the two former are each compared is styled the *middle* term. In like manner are the premises named, that in which the major term is compared with the middle being the major premiss; the other, the minor premiss.

Much objection has been taken to this employment of the words major and minor on account of their ordinary signification being respectively "greater" and "smaller," whereas it sometimes happens that the minor term is in reality *greater* than the major term, or that we are unable to compare them together as regards their extent. There is no doubt that these names were originally imposed from their representing the facts of the case in one particular form of syllogism which was considered the most perfect; but as they have continued to be used by numerous logicians who were well aware of how the matter stood, it must be inferred that "major" and "minor," when used logically, have merely a technical meaning as distinguishing the terms of the conclusion, and not as implying any relative degree of amplitude. A parallel case is to be found in the use of the word "opposition" (see p. 41). In consequence of such objections, the premises of a syllogism have been variously re-named, the appellations of *proposition*, *lemma*, and *sumption*, being bestowed upon the major premiss, while the minor is known as the *assumption*, *subsumption*, or *hypolemma*.

2. *The premises must not both be negative.* This follows from the consideration that a term can only show the relation of agreement or disagreement subsisting between two others, in so far as it is applicable to one of them at least. If, for instance, we were first to say, "No mathematician is a good moral reasoner," and then that "Shakspeare was not a mathematician," these statements would give us no grounds of comparison between the notions of "Shakspeare" and "good

moral reasoner." We should still be uncertain as to whether the latter might or might not be predicated of the former.

3. *If either of the premises be negative, the conclusion must also be negative;* for this is precisely the case stated in the second portion of the proximate canon above laid down, viz., "If one notion is agreed and another disagreed with one and the same third, they disagree with each other." Thus, from the premises, "no matter is imponderable," and "all gases are matter," we can only conclude that "no gases are imponderable;" for the attribute of imponderability was totally denied of matter, which contains, *inter alia*, all gases.

4. *When the premises are affirmative, if either of them be attributive, the conclusion must also be attributive.* Since a substitutive premiss implies a *total* identicality in extent of the middle term with one of the terms of the conclusion, and an attributive premiss implies only a *partial* identicality of like nature, it follows that between the terms of the conclusion a *partial* identicality of extent is all that can be inferred. An example of this will be found in the following syllogism:—

Compounds are all bodies which may be resolved into simpler forms (U),
Sugar is a compound (A);
∴ Sugar is a body which may be resolved into a simpler form (A).

5. *The middle term must be more than distributed in the premises, both taken together.* For if this were not the case we should have no real inference whatever; as witness this apparent syllogism—

Some beautiful objects are pictures,
Some hideous objects are pictures;
∴ Some hideous objects are beautiful.

Here the two premises are in the form I, which we know does not distribute the predicate, this, in the present case, being the middle term "pictures." Accordingly, the major and minor terms may, for anything the form of expression can tell us, be compared with different portions of the same thing; and this, being equivalent to employing *two* middle terms, would violate the first rule, which prohibits the appearance of

more than three terms altogether. Of course it might so happen that when premises of the above nature were used, we arrived at a true conclusion, as in the following case :—

Some beautiful objects are pictures,
Some valuable objects are pictures ;
∴ Some valuable objects are beautiful.

This conclusion would, however, still be considered as invalid, that is, as not following directly and inevitably from the premises ; for Logic, it will be remembered, regards not the *matter*, but merely the *form* of reasoning.

Usually the middle term is distributed in one of the premises at least; we can then tell at a glance that the rule now under discussion is not violated. Take, for example, the syllogism—

All the metamorphic rocks have been subjected to the action of heat,
Gneiss is a metamorphic rock ;
∴ Gneiss has been subjected to the action of heat.

The major premiss being A, distributes the middle term ; and as this must be again mentioned in the minor premiss, it will necessarily be more than distributed, and will not affect the validity of the conclusion.

Sometimes, however, we meet with a syllogism whose premises contain the middle term in such a manner as to show that the portions employed in each, if added together, would give more than the whole ; *e.g.*—

Twenty per cent. of these knives are bad,
Ninety per cent. of them are apparently well-made ;
∴ Some of these apparently well-made knives are bad.

In this case suppose that the notion "bad" coincides with the entire portion of "these knives," with which "apparently well-made" does not ; such portion being only ten per cent. would still leave a further extent of ten per cent. to be accounted for, and this it is evident must come out of the "ninety per cent. ;" so that we are sure that the notions "apparently well-made," and "bad," must correspond to the extent of ten per cent. at least : this is asserted in the conclusion.

It will in this place be opportune to remark that much con-

fusion frequently results from the use of an *ambiguous* middle term, thus :—

Capes are articles of clothing,
Some tracts of land are capes ;
∴ Some tracts of land are articles of clothing.

This syllogism is *logically* correct, that is, in form ; but if we examine its matter, we shall see that it contains two middle terms, for in the major premiss one kind of "cape" is spoken of, while in the minor, another kind is alluded to. The discussion of such cases will be further conducted when we come to examine the subject of fallacies.

6. *In the conclusion no term must be distributed, unless it has also been distributed in one of the premises.* The terms of the conclusion only agreeing or disagreeing with each other in so far as they respectively agree or disagree with the middle term ; they can merely be compared with each other by means of those portions which were found to coincide in any way with the middle term.

All trees are organised beings (A),
Men are not trees (E) ;
∴ Men are not organised beings (E) ;

And again—

Diamonds are combustible (A),
Some precious stones are diamonds (I) ;
∴ All precious stones are combustible (A).

In the former of these syllogisms we have an *illicit process* of the major ; that is, the major term is distributed in the conclusion without being so in its premiss : in the latter there is, in like manner, an illicit process of the minor. The valid conclusions which might be inferred would respectively be "men are not *some* organised beings" (η), and "*some* precious stones are combustible" (I).

By the six foregoing rules may all syllogisms be tested to ascertain whether they are real or only apparent,—whether the reasoning is correct, or incorrect. They are of great practical importance, as they enable us to dispense with the reduction of many syllogisms into a form where the dictum of Aristotle might be *directly* applied ; but, as already stated, they must only be considered as proximate differentiations of one fundamental truth.

§ 8. *Of Figure.*

In order to facilitate a full examination of syllogistic arguments, that is, of arguments formally expressed, logicians have investigated the number of positions which the middle term may assume in the premises, and in accordance thereto, have formed four classes, under which all possible syllogisms may be ranged. These classes they call *figures*, the form of which may be represented as follows; employing P to signify the major term (predicate of conclusion), S the minor (subject of conclusion), and M the middle.

1st Fig.	2nd Fig.	3rd Fig.	4th Fig.
M P	P M	M P	P M
S M	S M	M S	M S
∴ S P	∴ S P	∴ S P	∴ S P

Thus when the middle term is the subject of the major premiss, and the predicate of the minor, we have the first figure; when it is the predicate of both, the second; when it is the subject of both, the third; and finally, when it is the predicate of the major, and subject of the minor, there results a syllogism of the fourth figure.

§ 9. *Remarks upon the four Figures.*

1. The first figure is the most natural and obvious form into which an act of reasoning can fall; the cause of this apparently being that it is the only one in which the Aristotelian dictum will at once and immediately apply. Thus, to give a concrete example—

The rushing of particles to a nucleus causes the body so formed to rotate,

The earth was formed in this manner;

∴ The earth rotates.

This argument, which is employed by the author of "Vestiges of Creation," I have expressed in popular language, but the student will find no difficulty in arranging it according to the model; "All M is P; S is M; therefore S is P."

2. The second figure, though a somewhat distorted method of stating an argument, is yet very useful and ready in certain

cases, where we desire to prove that some distinction exists between two notions, so as to prevent one of them including the other. Suppose, for instance, we wished to prove that a certain substance did not contain the metal sodium; we might employ such a syllogism as the following:—

Any substance containing sodium would give, when burnt, two yellow bands in its spectrum (U),

This substance when burnt does not do so;

∴ This substance does not contain sodium.

Here the middle term forms the predicate of both premises; consequently, the syllogism is of the second figure. If, however, we wished to apply the Aristotelian dictum, it would be necessary to arrange this argument according to the first figure, such an operation being termed *reduction*. It consists in a skilful application of the doctrines of opposition, conversion, and coincident junction. In the present case all that we have to do is to substitute for the major premiss its simple converse, thus—

Any substance which when burnt gives two yellow bands in its spectrum, contains sodium,

This substance when burnt does not do so;

∴ This substance does not contain sodium;—

a syllogism most manifestly of the first figure.

It has been held that in every case the mind unconsciously performs the process of reduction, and that therefore the second, third, and fourth figures are merely elliptical expressions of *trains* of reasoning, the first figure alone being an adequate representation of a *single* mediate inference. This statement, as implying a more *direct* influence than is usually imagined of the dictum upon our minds, is not unworthy of attention; but since a full examination of the question would occupy more space than could be conveniently devoted to the purpose, I shall remain satisfied with having shown that any argument may be overtly expressed in such a manner as to evince its dependence upon the great fundamental law of reasoning.

3. The third figure is of use when we wish to disprove a theory by instancing some example to the contrary. If we wished to combat the assertion that "no bodies except water

ever expand when cooling," we might do so in this manner:—

Bismuth sometimes expands when cooling,*
Bismuth is a body other than water;
∴ Some other body than water occasionally expands when cooling.

The conclusion thus obtained is the contradictory (I) of the theory to be disproved (E), and accordingly our purpose is accomplished. In order to reduce this syllogism to the first figure, we must simply convert the minor premiss, when the whole will run thus—

Bismuth sometimes expands when cooling,
Some other body than water is bismuth;
∴ Some other body than water occasionally expands when cooling.

4. The fourth figure is chiefly remarkable for the offence which it has given to many logicians, who accordingly have been neither sparing nor gentle in their attacks upon it: "tortuous," "unnatural," "perverse," "hybrid," "useless," "clumsy," "a monster," and "a caprice" may be taken as samples of the objections raised to its reception. It will, therefore, be advisable to examine the nature of some syllogism in this figure: take, for instance, De Quincey's† explanation of the non-existence of duelling among the ancient Greeks and Romans, which is as follows:—

No duelling can exist wherever unlimited license of tongue is allowed to anger (E),
Unlimited license of tongue was allowed to anger among the ancient Greeks and Romans (U);
∴ Among the ancient Greeks and Romans duelling could not exist (E).

Here it is objected that the mind naturally expects the converse of the conclusion, in accordance with the tendency of the argument—this leading from "no duelling can exist where certain license is allowed," to "this license was allowed among the Greeks and Romans," and then in all symmetry to "no duelling could exist among the Greeks and Romans."

Now the answer to this is, that the figure of a syllogism

* It invariably expands at the point of solidification.
† Works. Author's Edition. Vol. vii. p. 281.

depending entirely upon the position of the middle *term* in the *premises*, it will not be affected by a change in the relative positions of *conclusion* and premises. We have, therefore, only to state the conclusion first, and then give the premises as our reasons for forming it, when we shall at once obtain a smooth and naturally proceeding argument. Thus, we can say "Among the ancient Greeks and Romans duelling could not exist; for this is impossible where unlimited license of tongue is allowed to anger, which was the case in Greece and Rome;" than which a more harmonious expression could not easily be found.

In like manner, if we take mere arbitrary symbols to represent the three terms, we shall still have a perfectly clear syllogism, *e.g.*—

No S is P (conclusion);
for No P is M (major premiss),
and M is all S (minor premiss);

the meaning of which is, that none of the objects comprised by S are included by P, since the latter is totally excluded from M, which contains the same objects as S.

At the same time, however, that the fourth figure is thus shown to be perfectly legitimate and unforced, it may be readily conceded that it is but seldom used, as from the same premises and the converted conclusion we can form a syllogism of the first figure: thus, "M is all S; no P is M; therefore no P is S;" which being, as it were, more familiar to the mind, is oftener suggested.

The formal reduction of syllogisms like the above to the first figure, is effected by simply converting both premises; *e.g.*—

No M is P,
All S is M;
∴ No S is P

§ 10. *Of Mood or Mode.*

The arrangement of the propositions of a syllogism with reference to their quantity, quality, and relation, is termed the *mood* or *mode* of the syllogism; and as we are in possession of symbols which fully express the form of a proposition, we can at all times represent the mood by the arrangement

of these letters: the conclusion, it is well to remark, being always placed last.

Now as there are eight kinds of propositions, viz. U, A, E, η, Y, I, O, and ω,—it follows that five hundred and twelve forms of syllogisms or moods may be made. Most of these, however, do not constitute valid arguments, and therefore we must reject them; *e.g.* A O A has an *affirmative* conclusion, though one of its premises is *negative;* E O O has *both* premises *negative;* I I I has either the *middle undistributed* or else an *illicit process;* and so on in numerous other cases. In like manner some moods are admissible in one figure, but not in another; thus, A I I is valid in each of the first and third figures, but in the second and fourth the middle term would be *undistributed.*

§ 11. *Table of Valid Syllogisms in each Figure.*

From the foregoing considerations it will be evident that a table may be constructed which will show all the valid syllogisms falling under each figure; and as such a table is of great practical use, I have drawn up the following:—

TABLE OF MODES.

Fig. I. Aff.	Fig. I. Neg.	Fig. II. Aff.	Fig. II. Neg.	Fig. III. Aff.	Fig. III. Neg.	Fig. IV. Aff.	Fig. IV. Neg.
A A A	E A E	A U Y	A E E	A A I	E A O	A A I	A E E
A I I	E I O	A Y Y	A O O	A I I	E I O	A U A	E A O
A U A	E U E	. . .	E A E	A U A	E U E	A U Y	E I O
A Y I	E Y O	. . .	E I O	A Y A	E Y E	. . .	E U E
			E U E	. . .	. . .	. . .	E Y E
			E Y O			. . .	E Y O
I U I	O U O	I U I	. . .	I A I	O A O	I A I	
I Y I	O Y O	I Y I	. . .	I U I	O U O	I U I	
U A A	U E E	U A A	U E E	U A Y	U E E	U A Y	U E E
U I I	U O O	U I I	U O O	U I I	. . .	U I I	U O O
U U U	. . .	U U U	. . .	U U U	. . .	U U U	
U Y Y	. . .	U Y Y	. . .	U Y A	. . .	U Y A	
						U Y Y	
Y U Y	Y E E	Y A A	. . .	Y A Y	Y E E	Y I I	
Y Y Y	Y O O	Y I I	. . .	Y U Y	. . .	Y U A	
		Y U A				Y Y I	
		Y Y I					

The above table is arranged alphabetically, so as to facilitate reference, and enables us at once to determine the validity or invalidity of any syllogism whose figure is known; for if legitimate, it will be found in its proper position, while if inadmissible, it will be absent.

The propositions η and ω have been omitted from this table on account of their small importance (see p. 34). It may also be proper to remind the student that in most of the older treatises on Logic he will find tables of judgments which differ materially from the one above given, inasmuch as they only recognise the four propositions A, E, I, and O. The usual form in which such a table is given consists of the following four mnemonic Latin verses:—

Fig. I. Barbara, Celarent, Darii, Ferioque, *prioris;*
Fig. II. Cesare, Camestres, Festino, Baroko, *secundæ;*
Fig. III. *Tertia*, Darapti, Disamis, Datisi, Felapton, Bokardo, Feriso habet: *quartâ* insuper addit
Fig. IV. Bramantip, Camenes, Dimaris, Fesapo, Fresison.

These lines, or rather the first three, were the invention of Pope John XXII., whose work upon Logic, under his name of Petrus Hispanus, enjoyed great celebrity. To each of the four figures it will be observed that a verse is appropriated, consisting chiefly of a number of names distinguished by capital letters,* and containing three vowels; the vowels thus employed serve to indicate the mood of the respective syllogisms. For instance, the syllogism "all M is P; all S is M; therefore all S is P," is said to be in the mood *barbara*, which signifies A A A in Fig. I. The *consonants* of the various moods are intended to assist the process of reduction; the *initial letters* show that each mood must be reduced to that mood in the first figure which is similarly characterised: *s* indicates that the proposition immediately preceding is to be *simply* converted (in its old acceptation; see p. 46); *p* that it is to be converted *per accidens*, except in the mood *bramantip*, where it denotes that the conclusion (I) will, when the syllogism is reduced, become A; *m* that the premises are to be transposed; and *k* that the contradictory of the con-

* Tertia, in the third verse, is merely employed for the sense of the expression, and is not a mood.

clusion is to be substituted for the immediately preceding proposition. The two moods, however, in which *k* occurs (*baroko* and *bokarko*) may be more simply reduced by employing the process of privative conversion; they will then become *ferio* and *darii* respectively.

An example will perhaps assist in rendering the above description intelligible. Let us take a syllogism in *disamis*; thus,—

Some rocks have been formed by the action of water (I),
All rocks are solid (A);
∴ Some solid things have been formed by the action of water (I).

Here the *m* indicates that the premises must be transposed, the major and conclusion being simply converted in accordance with the requirements of *s* and *s*. When this is done, we obtain the following:—

All rocks are solid (A),
Some things which have been formed by the action of water are rocks (I);
∴ Some things which have been formed by the action of water are solid (I);—

which is a syllogism in *darii*, that mood of the first figure which was indicated by *D*, the initial letter of *disamis*.

I have thought it advisable to enter at some little length upon this subject, as these ancient names of moods are not confined to logical works, but are often to be met with in old authors; in addition to which, it might be expected that in a work like the present, of professedly a practical character, some notice would be taken of a method so universally followed. In fact, the perfect adaptation of the above quoted lines to their purpose, would alone render them deserving of mention; for, as Sir William Hamilton observes, "it must be confessed that, taking these verses on their own ground, there are few human inventions which display a higher ingenuity."

It must also be observed that so far from the method just described being out of date and obsolete, it may still be applied in many cases; the only difference between it and the table of judgments given in the present volume, being

that the latter is much more complete, containing not only all that the A, E, I and O system includes, but many other syllogisms in addition.

§ 12. *Induction and Deduction.*

We have now seen that all acts of mediate inference when formally expressed, *i.e.* all syllogisms, may be systematically arranged and discussed under the two heads of mood and figure. There are, however, some further divisions of syllogisms which require our attention; the first of these being that into *inductive* and *deductive*.

The distinction between these two methods of reasoning may be thus expressed: induction is the process of forming a general law; deduction, that of applying a law so made to some particular case or cases. Or, in other words, induction consists in reasoning from the *parts to the whole;* deduction, in reasoning from the *whole to the parts.* In *formal* Logic, however, this distinction is comparatively unimportant, as will be seen from the following considerations.

Take some inductive syllogism, as follows:—

Oxygen, chlorine, and steam are elastic (A),
Oxygen, chlorine, and steam are all gases (U);
∴ All gases are elastic (A).

Here we see that from predicating "elastic" of the various parts "oxygen, chlorine, and steam," we are enabled to predicate it also of the whole thus constituted, viz., "gases." It is, therefore, evident that the general law or truth upon which the validity of such a syllogism depends, may be thus expressed:—"That which belongs, or does not belong, to each and every one of the parts, also belongs, or does not belong, to the whole." This law has been declared to differ from the *dictum de omni et nullo*, which, the student will remember, is to the following effect: "That which belongs, or does not belong, to the whole, also belongs, or does not belong, to each and every one of the parts." Now if we admit the difference thus asserted—that is to say, if we admit that these two laws are "equally necessary and *independent*" *—then we must, in

* Hamilton's "Logic," vol. i. p. 321. The italics are my own.

addition, admit that the division into inductive and deductive syllogisms is imperatively called for, since each species of reasoning will have been shown to rest upon separate fundamental* laws.

That this independence, however, does not exist, may be shown by a few reflections based upon the nature of what we understand by the notion of a "whole." In the case under examination the "whole" of which we speak is the conception "gas." This, as the student will recollect from what was said in a previous chapter, is the result of our comparing various bodies together, and ascertaining those attributes in which they are all agreed; the set of attributes so obtained being then abstracted to form the idea, and receive the name of "gas." Consequently, when we say "gases," we think of a class whose members are, *not various individual objects*, but *various similar sets of attributes* existing in separate bodies or objects, viz., "oxygen, chlorine, and steam;" and when we say that what may be predicated of the class "gases," may also be predicated of each of its members, we mean that the attribute "elasticity," for instance, may be predicated of oxygen, chlorine, and steam, not as *individual objects*, but as *separate and similar sets of attributes;* or, in other words, we imply that each set of attributes must be capable of forming the idea "gas" in our minds, and must, consequently, be of similar constitution with the remainder. In like manner, when we say that whatever may be predicated of each member may be predicated of the class "gases," we mean that whatever attribute is common to oxygen, chlorine, and steam must form part of that *set of attributes* which is called "gas;" that is, we imply that oxygen, chlorine, and steam, *considered as definite sets of attributes*, are of similar constitution, and must consequently each be capable of forming the same idea, "gas," in our minds. Now these two expressions, which are thus seen to have almost identical meanings, are the self-same laws which have been spoken of as independent of each other, this statement, therefore, is seen to be incorrect, and, accord-

* As regards the use of the word *fundamental* in this place, see Appendix C.

ingly, we need not consider the distinction between the processes of induction and deduction as more than a logical trifle.

It must here be rigidly borne in mind, that the above remarks only apply to induction and deduction when considered as divisions of *pure* Logic; for when we come to treat upon *applied* Logic, it will be found that another kind of induction exists, which necessitates a particular mention, and which is of very great importance. The difference between these two kinds of induction is closely connected with a fact which the student has doubtless observed, viz., that the minor premiss of our inductive syllogism is obviously incorrect, for so far from oxygen, chlorine, and steam being *all* gases, they only constitute an exceedingly small portion of the class. This brings us to the consideration that in formal Logic we have nothing at all to do with *truth* or *falsehood;* we can only ascertain whether a conclusion *legitimately* follows from premises already *granted.* Accordingly, we merely look upon the minor premiss with reference to its *form, i.e.,* its quantity, quality, and relation, and not as regarding its *matter,* viz., the *reality* and *nature* of the notions composing the subject and predicate: thus, for all purely *logical* purposes, the proposition might be replaced by "X, Y, and Z, are all S" without in the least interfering with the reasoning process. Applied Logic, on the contrary, takes into account the relative natures of the objects furnishing notions, and would construct the syllogism in the following manner:—

Oxygen, chlorine, and steam are elastic (A),
Oxygen, chlorine, and steam are gases (A);
∴ *All* gases are elastic (A).

Here it will be seen that the minor premiss is indeed *true,* but then there is an *illicit process* of the minor term, so that the syllogism cannot be admitted as *formally* valid.

The deductive syllogism corresponding to our inductive example would be as follows:—

All gases are elastic,
Oxygen is a gas;
∴ Oxygen is elastic—

where the general law is applied to a particular case.

§ 13. *Extension and Intension.*

In a former chapter it was explained that a proposition might have its meaning regarded from different points of view, according as the subject and predicate were regarded intensively or extensively. Thus, when we say, "All fluids are compressible," we mean not only that the attributes of "compressibility" are among the attributes of every "fluid" (intension), but, also, that the class of "compressible substances" numbers in its ranks all "fluids" (extension). This differentiation of meaning, in like manner, finds place among arguments, and thence has arisen a distinction of syllogisms into *extensive* and *comprehensive* (intensive). An extensive syllogism is of this nature—

Motion is immaterial,
Heat is motion;
∴ Heat is immaterial,—

and would be thus interpreted:—

Motions are contained in the class of immaterial objects,
Heat is contained in the class of motions;
∴ Heat is contained in the class of immaterial objects.

The same syllogism, if stated comprehensively, or intensively, would run as follows:—

Heat is motion,
Motion is immaterial;
∴ Heat is immaterial;—

and its meaning, when broadly stated, would be this:—

Heat comprehends in it the attributes of motion,
Motion comprehends among its attributes those of immateriality;
∴ Heat comprehends the attributes of immateriality.

An examination of these four syllogisms will reveal their dependence upon each other; all of them being evidently the same result of the same process of reasoning. This is rendered clear by a brief analysis of the import which attaches to predication. We say, for instance, that "motion is immaterial," and in doing so we state that a certain relation of congruity exists between two compound ideas: "*motion*," which consists of two sets of attributes, viz., the generic feature "immateriality" and certain specific differences; and "*immaterial*

objects," which likewise is duplicate, containing the notion "immateriality" *per se*, and the notion of "immateriality" indefinitely repeated, as existing in combination with various sets of specific differences. It therefore results that the *relation* implied by our predication is also *compounded*, its constituents being, that motion is an immateriality united with certain distinguishing marks; and that motion is capable of producing on the mind, together with other impressions, the same idea that immateriality *per se* would do. These two relations it will easily be seen are those of extension and intension. But another fact remains to be noticed: that although the two ideas and relations are thus shown to be *compound*, yet the union of their respective parts is so intimate that they cannot be separated. We are unable to resolve the idea "motion" into its two sets of attributes, "immateriality" and "specific differences," so as to think of these separately, and at different times: we are also unable to divide the idea "immaterial objects" into "immateriality" *per se*, and "immaterialities" respectively combined with distinguishing attributes; and, finally, we are unable to think of one of the relations above described without also thinking of the other. The utmost we can do is to bring one portion of the compound idea, or relation, into greater prominence than its fellow, by concentrating our attention *as much as possible* upon the chosen part; it being remembered that we cannot so concentrate the *whole* of our attention, and, therefore, we must always, in some measure, be impressed by the less important constituent.

These observations, if taken in conjunction with those contained in the section upon induction and deduction, will, it is hoped, afford an intelligible and clear view of the manner in which the mind acts when comparing notions and judgments; and as the operation is always identical, being, though complex, yet irresoluble, it follows that the only useful, or, strictly speaking, admissible division of judgments and reasonings, is that which merely refers to their form. Hence, in formal Logic the distinction between the processes of extension and comprehension must, like that between induction and deduction, be considered as of trifling consequence.

§ 14. *Denomination.*

When speaking of the interpretation of the copula, I mentioned that another mode of doing so had been suggested, in addition to those connected with the doctrines of extension and intension. This was the interpretation of *denomination*, and is as applicable to arguments as to propositions: for example, the syllogism—

All planets are stars,
Mercury is a planet;
∴ Mercury is a star,

may be thus translated:—

Planets may be called stars,
Mercury is a planet;
∴ Mercury may be called a star.

This interpretation is, of course, merely verbally significant, and is not intended to imply any approach to a radical, or even formal difference between the syllogisms. The doctrine, if doctrine it may be called, must, therefore, be received as nothing more than a practical hint for turning a syllogism to some special account, and as such belongs properly to applied Logic. Former usage, however, is my excuse for placing it here.

§ 15. *Syllogistic Arrangement of Propositions.*

Before concluding the subject of pure-categorical syllogisms, it will be advisable to mention a matter about which the student might otherwise entertain an erroneous opinion. I allude to the *order* of the three propositions constituting a syllogism. It will have been observed that the usual course pursued is to place the major premiss first, the minor next, and the conclusion last; and it may consequently be thought that this order is the one most in accordance with natural laws. Such, however, is not the case; the arrangement in question being merely an arbitrary practice adopted by logicians in order to facilitate their expositions of the science.

In fact, it frequently happens that the conclusion occurs to the mind as a problem or thesis, which requires certain judgments (premises) to be formed, in order that its validity

may be apparent. Thus, I might suspect a certain gas to be hydrochloric acid, but in order to be sure it would be necessary for me to find some *proof* of this. Accordingly, knowing the general law that ammonia produces white fumes only when brought into contact with hydrochloric acid, I should proceed to test the suspected gas in this manner; and, the anticipated result following, I should be enabled to construct the syllogism :—

This gas is hydrochloric acid;
Because, It produces white fumes with ammonia,
And, Everything which does that must be hydrochloric acid.

Here the premises and conclusion are reversed. Again, some fact comes under our notice, such as, "This metal takes fire upon touching water;" we make inquiries, and find that "The only metal behaving in such a manner is potassium;" hence we draw the conclusion that "This metal is potassium." An argument so expressed is a syllogism of the first figure, but with the premises reversed. Accordingly, it thus appears that there is no natural and definite *order* of judgments; it cannot, therefore, be said that any arrangement is incorrect, or alone correct, the disputes between logicians upholding different models being so many lost words, we can scarcely say arguments.

§ 16. *Conditional Syllogisms.*

We have now to consider the case of syllogisms whose constituent propositions are not all pure-categoricals; and first we will examine those in which one or more *conditional** judgments appear, the argument being then termed a conditional syllogism.

Now these reasonings may be treated in two ways—practically, and theoretically; that is to say, their own special canons or proximate rules may be applied to them as they stand; or they may be reduced to categorical syllogisms, when, of course, they immediately fall under the laws which

* I omit *modal* propositions, as these cannot be treated otherwise than as pure-categoricals. See p. 28.

have been analysed in the foregoing pages. And, first, as they stand.

Every conditional proposition consists of two parts—the antecedent and the consequent—between which a certain relation is asserted to exist. These parts are both distinct judgments, the relation being that the consequent depends upon the antecedent in such a manner as to necessitate the inference of the former if the latter be granted; *e.g.*, "If the anchor holds out, the ship will be saved," where "If the anchor holds out" is the antecedent, "the ship will be saved" is the consequent, and the relation asserted is, that if we admit that the anchor *will* hold out, then we must also admit that the ship will be saved. A complete syllogism having such a proposition for a premiss, would be of the following form:—

If the anchor will hold out, the ship will be saved,
The anchor will hold out;
∴ The ship will be saved.

In cases where *both* the premises are conditional, then the conclusion must be conditional also, *e.g.*—

If the anchor will hold out, the ship will be saved,
If the storm does not increase, the anchor will hold out;
∴ If the storm does not increase, the ship will be saved.

Now, from a consideration of the relation subsisting between the antecedent and consequent of a conditional proposition, logicians have devised two practical rules, which suffice to determine the validity of any conditional syllogism without reducing it to a categorical form. These are:—

1°. *If the antecedent be granted, the consequent may be inferred;* for this is merely to state the nature of the assertion made by the form of the proposition. Nothing, however, follows from granting the consequent: thus, in the proposition "If he is truly wise, he will be happy," we must infer that he will be happy, if we admit that he is truly wise; but admitting him to be happy will not prove him to be wise, as it is possible for an ignorant person to enjoy himself.

2°. *If the consequent be denied, the antecedent may also be denied.* This follows from the consideration that the truth of the consequent is necessitated by that of the antecedent, so that if the latter were true, the former would be so too.

If, for example, we deny the consequent of this proposition, "If he be shot through the heart, he is dead," and say that he is not dead, we may evidently infer that he is not shot through the heart; but to deny the antecedent would not enable us to say that he is not dead, because he may have been killed by many other causes.

These two laws have given occasion to a division of conditional syllogisms into two moods, viz., the *ponent*, wherein the antecedent is granted, and the *tollent*, where the consequent is denied. These moods are reciprocally convertible, as may be seen from the following example:—

If the moon is not shining, the night is dark,
The moon is not shining;
∴ The night is dark.

This is in the ponent mood; but if we wish to make it tollent, we may do so by reversing the hypothetical, and duly negating, thus:—

If the night is not dark, the moon is shining,
The moon is not shining;
∴ The night is dark.

These moods are also termed constructive and destructive, answering respectively to ponent and tollent.

The second method of treating conditional-syllogisms is, by reducing them to categoricals. Such a proceeding has, indeed, been condemned by high authority* on the ground of its being unnecessary and not always possible. I venture, however, in common with many logicians,† to think that this condemnation is erroneous, as both of the objections urged may be thus disposed of. The reduction is *necessary*, as, by this means, conditional-reasoning being brought under the same *proximate* laws with categorical arguments, is shown to be of exactly the same nature, and so the unity of the reasoning process is maintained; at the same time, however, I do not contend that it is necessary for *practical* purposes, as then the rules above explained would become inept. Again, that the

* Krug's "Logik," p. 258. Bachmann's "Logik," § 89, Anm. 2. Sir W. Hamilton's "Logic," vol. i. p. 342.

† Esser's "Logik," § 99; Wolf's "Philos. Rat.," § 412; Whately's "Elements," book ii. chap. iv., § 6; Thomson's "Outlines," § 73.

reduction is *never impossible*, may be seen from the very case adduced as presenting insuperable difficulties, viz., "If A is C, B is D; but A is C; therefore, B is D;" where we have only to say, "*The case of A being C* is *a case of B being D; the present case* is *a case of A being C;* therefore, *the present case* is *a case of B being D*," and the obstacle is surmounted, the resulting syllogism being a categorical in A A A, Fig. I., or, as the old logicians would say, in *Barbara*. The respective *terms* are here distinguished by being printed in italics.

That these objections should have been brought against the reducing process as applied to conditional syllogisms, is apparently owing, first, to the acceptance of the principle, "Infer nothing without a ground or reason" as a necessary and primary law of thought; and, secondly, to its being lost sight of that a term may be composed of more than one conception. With regard to the first of these causes, it may be observed, that the law there mentioned, called the law of reason and consequent, has been a subject of much discussion among metaphysicians and logicians, but should properly be referred to the former alone. By it the antecedent is explained as being "the complement of all, without which something else would not be," and the consequent as being "the complement of all that is determined to be by the existence of something else." This, which is Sir William Hamilton's explication, given with especial reference to conditional propositions, is, however, too wide and general for application in such cases; since, were we to admit that the consequent "*could* not be" without the antecedent, we must also admit, that by denying the antecedent we may deny the consequent, which is contrary to the second rule above given. It is likewise too wide and general to be considered as a separate law, for if the antecedent be the "*complement of all, without which* something else would not be," it must necessarily be that "something else" itself. Now, a thing cannot be something else; and, therefore, in order to attach any admissible meaning to the definition under question, we must interpret it thus:—"The antecedent is the same thing as the consequent, but from a different point of view," a state-

ment much the same as "a thing is itself," and answering to another primary law, viz., "whatever is, is." * Indeed, Sir William Hamilton's latest views would appear to have been in accordance with those advocated here, as we find him saying, that the law of reason and consequent "should be excluded from logic." †

The second source of objection which led to the statement that some conditionals could not be reduced, probably arose, as stated above, from an incomplete view of the structure of terms. Thus, in the syllogism, "If A is B, C is D; but A is B; therefore, C is D;" it was hastily concluded that there are four terms, A, B, C, and D; but, in so doing, it is assumed that the reasoning process concerns these simple notions; whereas, in fact, it is occupied with the more complex ideas, "A is B" and "C is D." Accordingly, instead of *four* terms, which of course would be incompatible with a categorical syllogism, we have only *two*, and require a third, viz., "the present case," before we can draw a conclusion. This third term is implied in the second premiss, when we say "A *is* B."

During the course of the preceding remarks, the student will doubtless have observed the technical method of reduction employed in these cases. It may be articulately enounced as follows: "Each conditional proposition is to be considered as a universal-affirmative-attributive categorical, with the antecedent for a subject, and the consequent for a predicate." Thus, the syllogism here stated,—

If a body is struck, heat is generated,
But if a meteorite falls into the sun, a body is struck;
∴ If a meteorite falls into the sun, heat is generated,

may be reduced in the following manner:—

All cases of "a body is struck," are cases of "heat is generated" (A),
All cases of "a meteorite falls into the sun," are cases of "a body is struck" (A);
∴ All cases of "a meteorite falls into the sun," are cases of "heat is generated."

* As regards the primary laws of thought, see Appendix C.

† "Discussions," p. 603.

In this way, or by using equivalent expressions, any conditional syllogism may be thrown into the form best adapted for displaying its real import as an act of reasoning.

§ 17. *Disjunctive Syllogisms.*

A *disjunctive* syllogism is an argument in which there is one, or more than one, disjunctive proposition, and may be represented by these formulæ: 1°. "A is either C or D; B is neither C nor D; therefore, B is not A." 2°. "A must be either C or D; but it is not C; therefore, it is D." 3°. "A is either C, D, or E; but it is not C; therefore, A is either D or E." 4°. "Either A is B, or C is D; but A is not B; therefore, C is D," &c. &c.

The import of the disjunctive propositions in all these syllogisms is, that the cases enumerated are the only possible ones, and that they are mutually exclusive; a perfect logical division has in fact been performed. Accordingly, the practical rules which result are—

1°. *From the assertion of one alternative, we may deny all the others; e.g.*, if in the proposition, "All men must be either white, black, red, or yellow," we were to affirm, "These men are red," we might infer that "they are neither white, black, nor yellow."

2°. *From the disjunctive assertion of more alternatives than one, we may deny the rest.* Thus, in the above example, if we were to say, for our second premiss, that "these men are either white or black," we should then conclude that "they are neither red nor yellow."

3°. *From the denial of one, or more than one alternative, we may assert such as remain; directly, if one, disjunctively, if more.* Accordingly, the following syllogism would be valid:—

All poems are either epic, lyrical, or didactic,
The poem of Paradise Lost is neither lyrical nor dadactic;
∴ Paradise Lost is an epic.

The reduction of disjunctive syllogisms to categoricals is similar to that of conditionals. Take, for instance, the syllogism just quoted—it will become:—

Poems which are neither lyrical nor didactic, are epics,
Paradise Lost is a poem which is neither lyrical nor didactic;
∴ Paradise Lost is an epic.

And here it must be stated, that in order to have a true conditional or disjunctive syllogism, it is necessary that the *reasoning* should hinge upon the *consequence* in the one case, and on the *alternative* in the other; for it is possible for a conditional or disjunctive *proposition* to exist in a categorical *syllogism;* thus,

All simple forms of matter are indestructible as such,
If the caloric theory be correct, heat is a simple form of matter;
∴ If the caloric theory be correct, heat is indestructible as such.

In this case, "*If the caloric theory be correct, heat*" must be considered as the minor term, for it is evident that the reasoning is merely a comparison of this, and the major term "indestructible as such," with the middle "simple forms of matter;" leaving the *consequence* of the conditional proposition altogether untouched.

§ 18. *The Dilemma.*

If in a syllogism there be a conditional premiss, whose antecedent or consequent is composed of a disjunctive proposition, such an argument is termed a dilemma, or hypothetico-disjunctive syllogism. Take, for example, the following:—

If the army were defeated, it must either have surrendered or retreated,
But it did neither of these;
∴ It was not defeated.

The rules upon which the validity of such syllogisms depend, are compounded of those referring to both conditionals and disjunctives; thus, 1°. *The antecedent being affirmed, either disjunctively or not, as the case may be, the consequent is also admitted;* and 2°. *The consequent being denied, either disjunctively or not, as the case may be, the antecedent is also denied.*

An argument of the above description is termed a *dilemma*

in consequence of its having two disjunctive members in the consequent of the major premiss: that is to say, it contains a double lemma, or double supposition. If there are three such members, it is a *trilemma*; if four, a *tetralemma*, and so on; but the name *polylemma* is usually applied to those containing more than four. Any one of these would, however, be loosely called a dilemma.

Such is the account commonly given of those arguments to which the name of dilemma is applied; but it is incomplete, as it does not refer to a class of syllogisms which, if anything, would fall more properly under that denomination. I allude to those in which several antecedents and consequents are disjunctively affirmed or denied; *e.g.*—

If he leaps out of the window, he will severely injure himself; if he does not do so, he will be burned,
But he must do either the one or the other;
∴ He must either severely injure himself, or be burned.

Or again—

If this man were happy, he would not be angry; and if he retained his self-command, he would not be excited,
But he is either angry or excited;
∴ He is either unhappy, or has lost his self-command.

In these syllogisms, we see that the major premiss (so to speak) is composed of two distinct conditional propositions, thus being a truer *di-lemma* than the cases previously considered.

All hypothetico-disjunctive arguments may be reduced, either to conditionals or categoricals at pleasure. There is no difficulty in the process, it being merely a judicious combination of the methods already studied, and as a general model, the following formula will be all that is needed. It shows the categorical reduction of a complex-dilemma, that is, where the major premiss is composed of two distinct conditionals.

Syllogism:—

If A is, B is; and if C is, D is,
But either A is, or C is;
∴ Either B is, or D is.

Reduction :—

1°. Take for a major *premiss* the categorical equivalent of the given minor; and for a minor *term*, the denial of the consequent in the *first* conditional of the given major premiss: complete the syllogism, thus

All non-A's are C's,
All non-B's are non-A's;
∴ All non-B's are C's.

2°. Take for a major premiss, the categorical equivalent of the *second* conditional in the given major; and for a minor premiss, the conclusion of the syllogism last formed: the conclusion resulting from these premises, will be the categorical equivalent of the disjunctive conclusion in the syllogism given for conversion: *e.g.*—

All C's are D's,
All non-B's are C's;
∴ All non-B's are D's;
or
Either B is, or D is.

§ 19. *Incomplete Syllogisms.*

When any one of the propositions forming a syllogism is not overtly enounced, such an argument is termed an *Enthymeme.* It will be evident that there is no difference in the *reasoning process* between enthymemes and formal syllogisms, as the premises and conclusion are in both cases the same: the distinction merely consists in the number of judgments that may be actually expressed in words. Accordingly, since there are three propositions in every syllogism, enthymemes are divided into three orders, which respectively suppress the major premiss, the minor premiss, and the conclusion. Examples of them may be thus given :—

The formal syllogism :—

All women are inquisitive,
Julia is a woman;
∴ Julia is inquisitive.

Enthymeme of the first order (the major suppressed) :—

Julia is a woman;
∴ Julia is inquisitive.

Enthymeme of the second order (the minor suppressed):—
All women are inquisitive;
∴ Julia is inquisitive.
Enthymeme of the third order (the conclusion suppressed):—
All women are inquisitive,
And Julia is a woman.

Into one or other of these three forms, nearly all arguments, as popularly expressed, fall; for it is seldom that a person takes the trouble to state a syllogism in full. This elliptical method of overt inference, is most strikingly developed in those arguments which were discussed under the heads of *Opposition*, *Conversion*, and *Coincident-Junction*, where not only is a premiss not expressed, but it is almost *unconsciously* thought; so much so, indeed, that it requires a searching investigation to become convinced of its existence. We need not wonder, therefore, at their being often termed immediate inferences. Conditional judgments too, are frequently of an enthymematic nature, such as, for instance, "If Pegasus be a horse, it must be a quadruped," which manifestly proceeds upon the assumption that "all horses are quadrupeds."

§ 20. *Complex Arguments, or Chains of Reasoning.*

It often happens that we arrive at a conclusion through a string of correlative syllogisms, and when this is the case we have what is termed a *chain of reasoning*. These arguments are, however, generally of an enthymematic form, and are divided according as they suppress the conclusion, or one of the premises, in each syllogism.

Those chains of reasoning, where all conclusions but the one desired are suppressed, must necessarily consist of premises, and this form is known as a *sorites*. It may be of two kinds—first, where the predicate of each premiss is the subject of the next succeeding one, and where the conclusion is the last predicate affirmed of the first subject; this is termed the ascending, regressive, or Aristotelian sorites: and secondly, where the subject of each premiss is the predicate of the next, and where the conclusion is the first predicate affirmed of

the last subject; this is styled the descending, progressive, or Goclenian sorites. The formulæ of these are :—

Aristotelian.	Goclenian.
A is B,	D is E,
B is C,	C is D,
C is D,	B is C,
D is E;	A is B;
∴ A is E.	∴ A is E.

Or, concrete examples may be given, as follows :—

Aristotelian :—

Red is a colour,
A colour is a kind of light,
All light is a kind of motion;
∴ Red is a kind of motion.

Goclenian :—

All light is a kind of motion,
A colour is a kind of light,
Red is a colour;
∴ Red is a kind of motion.

It will have been observed, that the formulæ are entirely affirmative; this arises from the rule that we can draw no conclusion from negative premises. We may, however, have the last premiss of the series negative, but then the conclusion must be negative also, thus :—

Red is a colour,
A colour is a kind of light,
All light is a kind of motion,
No motion is material;
∴ Red is not material.

A sorites containing premises of the above description, may have its validity directly tested by this modification of the *dictum* :—"Whatever belongs, or does not belong, to a given whole, belongs, or does not belong, to each and every one of the parts constituting any whole contained in the given whole." If, however, the premises are of different forms (I, U, &c.), and the reasoning, in consequence, rather complicated, we may readily ascertain the legitimacy of the sorites by a process of dissection; that is, by resolving it

into its constituent syllogisms. The formulæ for this purpose are the following :—

Aristotelian.	Goclenian.
A is B, Minor,	D is E, Major,
B is C; Major,	C is D; Minor,
Minor, (∴ A is C), Conclusion.	Major, (∴ C is E), Conclusion.
Major, C is D;	Minor, B is C;
Conclusion. (∴ A is D), Minor,	Conclusion. (∴ B is E), Major,
D is E; Major,	A is B. Minor,
∴ A is E. Conclusion.	∴ A is E. Conclusion.

From this diagram, it will be seen that each suppressed conclusion forms the *minor* premiss of the succeeding syllogism in the Aristotelian sorites, and the *major* in the Goclenian. Accordingly, if we detect any false mood among the syllogisms, all its successors will be invalid, as depending upon an erroneous premiss.

A chain of reasoning, wherein one, or more than one premiss is suppressed, is termed an *epicheirema*, and may be of three orders ; first, where the *major* premiss of the main syllogism is the conclusion of another syllogism, with but one premiss expressed ; secondly, where the *minor* premiss is similarly characterised ; and lastly, where the conclusion forms the sole expressed premiss of a succeeding syllogism, a second conclusion thus resulting. The epicheirema may also be single, double, or treble, according as it is a combination of one, two, or three orders.

The nature of these arguments will be evident from an inspection of the following examples :—

Single epicheirema of the first order (the major a conclusion) :—

All planets are attracted by the sun ; for they revolve about him as a centre,

The earth is a planet ;

∴ The earth is attracted by the sun.

Single epicheirema of the second order (the minor a conclusion) :—

All birds are oviparous,

The condor is a bird ; for it has wings, feathers, and a heart ;

∴ The condor is oviparous.

Single epicheirema of the third order (the conclusion a premiss :—

Matter is imperishable,
Gold is matter;
∴ Gold is imperishable,
and
∴ Gold is eternal.

Treble epicheirema of the conjoint orders :—

He who is truly wise is just; for he is virtuous,
Aristides is truly wise; for he is led astray by no passions;
∴ Aristides is just,
and
∴ Aristides is happy within himself.

By symbolising, the last epicheirema may be thus extended into complete syllogisms; the propositions in parentheses being those which were suppressed :—

Conclusion.—A is B { (All C's are B's) major. / A is C . . . . minor.

Conclusion.—D is A { (All E's are A's) major. / D is E . . . . minor.

∴ D is B . . . . . minor.
(All B's are F's) major.
∴ D is F . . . . . conclusion.

The two syllogisms whose conclusions form the premises of the main argument, are called *prosyllogisms*, while the syllogism which takes the main conclusion for a premiss is termed an *episyllogism*.

In the strictest view of the science, pure Logic would take no cognisance whatever of incomplete or complex arguments; as in them the inference is not necessitated by the mere form of the expression. Since, however, all *practical* reasoning is of this nature, it would not be advisable to omit its consideration, as one of our objects is to show the universal extent of pure Logic, and also how its laws and principles pervade the whole universe of thought. We cannot, therefore, condemn the practice of logicians, who almost invariably have discussed these reasonings when treating upon the doctrines of logical elements.

§ 21. *Recapitulation.*

We have now concluded our investigation of the principles upon which the reasoning process is based, and of its various products. I shall, therefore, in accordance with my previous practice, briefly recapitulate the principal results at which we have arrived.

Reasoning in general is the eduction of a truth from some truths already established, but of whose full import we are not aware. It, therefore, cannot be an instrument for the *extension* of science, which would involve the discovery of fresh facts, but is of use in the due comprehension and orderly arrangement of our knowledge. It also follows that any processs of reasoning (termed a syllogism) is composed of two parts—the antecedent, or established truths, and the conclusion, or truth educed from them. Now the antecedent invariably consists of two judgments termed premises, but both of these are not always articulately enounced. This gives rise to a division of arguments into two classes; the one comprising certain syllogisms whose major premiss is always suppressed; the other comprising all that remain. The first of these classes is divided under three great heads, viz., *opposition*, or the relation subsisting between propositions which differ in form, but are identical in matter, such relation being either contradictory, contrary, subaltern, or subcontrary; *conversion*, or the transposition of the subject and predicate in a judgment, which may be of two kinds, simple and privative; and *coincident-junction*, or the inseparable union of the attributes in a conception. The second class, composed of formal syllogisms, requires as an essential preliminary of its treatment, the determination of a fundamental law which may decide the validity of all arguments. This law is found to be as follows: "Whatever belongs, or does not belong, to the containing whole, belongs, or does not belong, to each and all of the contained parts;" but, for proximate application, it is developed into this canon, "If two notions agree, either wholly or in part, with one and the same third, they agree with each other; but if one of them is agreed, and the other disagreed with the same third, they disagree with each other,"

which, variously differentiated for particular purposes, enables us to test the legitimacy of any syllogism. This canon formed, we find that all syllogisms whatever are susceptible of two methods of classification; first, with reference to the position of the middle term in the premises, whereby arguments are arranged into four *figures;* and, secondly, with reference to the form of the constituent propositions, the symbols representing these being grouped in threes, and termed *moods.* This distinction of figure and mood is sufficient as regards the form of syllogisms to determine their validity; but some other divisions respecting the import of arguments have a claim upon our notice. The doctrines of *induction* and *deduction* come first, and apparently depend upon different principles,—for induction reasons from the parts to the whole; deduction from the whole to the parts. A close examination, however, shows that, as far as *pure* Logic is concerned, they may be regarded as almost identical. Then follow *comprehension* (intension) and *extension,* which respectively interpret syllogisms as predicating an attribute of a notion, and a genus of a species; but this distinction also fades into obscurity when we reflect upon the irresoluble complexity of our ideas. Lastly, we have *denomination,* which identifies the reasoning process as one of naming; the significance of this interpretation being merely verbal. Having thus obtained a clear notion of the syllogistic theory, by confining our attention to arguments composed of categorical propositions, we proceed to the consideration of those cases wherein we meet with conditional judgments; and, by analysis, we find that they may all be referred to these two rules—1°. "The antecedent being granted, the consequent may be granted;" and 2°. "The consequent being denied, the antecedent may be denied." Next, taking the syllogisms which depend upon disjunctive judgments, we find that the principles involved are those of a perfect logical division; while those arguments which fall under the name of dilemma may be treated by a combination of the rules applicable to each of the two former classes. Lastly, we have to examine the popular method of stating arguments, and find that they either assume the form of *enthymemes,* or syllogisms with one proposition suppressed; or

else that they are expressed as *chains of reasoning*, these being of two kinds—a sorites, or string of premises with one conclusion; and an epicheirema, or syllogism whose premises are the conclusions of prosyllogisms, and whose conclusion is the premiss of an episyllogism.

§ 22. *Conclusion.*

Here, as stated in the introduction, the province of *pure* Logic terminates; and if the student has closely followed the foregoing analysis of its principles, he will be in a position to rightly appreciate its nature and end. Whatever may be the ulterior object for which the mind is cultivated, every person "must have thoughts to arrange, knowledge to transplant, and facts to record;" and the more effectually these can be done, the greater will be the progress. Now, the three great instruments for the above-mentioned processes are, first, Logic; secondly, languages; and lastly, the arts of memory.* Thus the superiority and precedence of Logic in point of utility is apparent: it prepares a sure and solid foundation; it arranges the materials as they arrive in regular courses; and, finally, completes the majestic edifice of a well-ordered mind Here, of course, I allude to the *science* of Logic; that is to say, the knowledge of the formal laws of thought as applied to the treatment of *acquired* information; consequently, we must not suppose that pure Logic will furnish us with powers of observation, or with facts to observe; its sphere being limited to the invigoration of those mental abilities with which we are respectively endowed, and to the elucidation of those truths which have already attracted our attention. It is but the few whom Nature has endowed with great intellectual power; and no amount of Logic, or of mental training, will supply the original deficiency. A Bacon or an Aristotle is born, not made. At the same time, however, the most commanding genius is capable of being raised to a still loftier

* Compare De Quincey, "Works," vol. xiii. p. 25, who advocates these views in a series of Letters, respecting which one can scarce tell whether most to admire their purity of style, their elegance of diction, their cogency of argument, or their subtle play of humour.

elevation; as much so as is the weakest mind. We are not, therefore, surprised to discover that the names of the most sedulous cultivators of Logic are those of the greatest philosophers that have ever lived. From Socrates, Plato, and Aristotle to Bacon; from Kanâda and Gotama to Kant; whether among the academic groves of ancient Athens, the busy haunts of British industry, the tropical luxuriance of eastern climes, or the ponderous reflections of learned Germany, there has ever been a bright succession of eminent men who have devoted their efforts to the investigation of the human mind, its thoughts, their principles, and laws. These principles they have employed, not only as regulators of the intellect, but also as guides and restraints in their search after truth, both moral and physical—such a disposition of the science being what is termed *applied* Logic, which will form our next subject of study.

CHAPTER V.

OF FALLACIES.

§ 1. *Applied Logic in General.*

We have now left behind us the sterile, but grand and impressive realms of theory, and are entered upon the luxuriant regions of practice, where there is everything to interest and to delight, but whose green and smiling soil too often hides a treacherous morass. Here, then, is the opportunity afforded to us of putting our experience to the test, and of determining in what way the rules, which we have been acquiring, may be of service to us.

Now, the ultimate end of all thinking, is the attainment of truth, and therefore, when we have ascertained what are the necessary laws of thought, we should not remain satisfied with this speculative knowledge, but should actively employ it as a means of advancement towards that higher object for which those laws were implanted. This operation it is, which forms the province of *applied* Logic, and which we are now about to consider, although the limits of our space must necessarily preclude any attempt to do more than take a cursory—but I trust, instructive—view of so vast a subject.

I have said that our object now is, to examine into the employment of the formal laws of thought as thought, for the purpose of attaining truth; and since we continually make use of one fact as a means of arriving at another, it follows that the practical application and operation of inference, must occupy much of our attention. Inference, however, may be examined from two points of view, positive and negative; for we must either reason correctly or in-

correctly: it follows, therefore, that the spheres of investigation which present themselves are—first, the essential conditions of, and inducements to, a legitimate inference; and secondly, the causes and nature of an illegitimate inference. The question now comes, which of these subjects shall we first examine? and the *ratio decidendi* must be the *end* which we propose to ourselves: this is the acquirement of truth, and can only be attained by a proper understanding of what constitutes correct inference. But, in order to properly understand what a thing is, we should first ascertain what it is *not;* for, as Bacon says, "Inductio quæ ad inventionem et demonstrationem Scientiarum et Artium erit *utilis*, Naturam separare debet, per *rejectiones et exclusiones debitas;* ac deinde *post negativas* tot quot sufficiunt, super affirmativas concludere." Accordingly, our immediate duty must be to investigate the conditions and concomitants of *incorrect* inference, or "bad reasoning," as it is generally termed.

Every argument consists in drawing a conclusion from certain evidence which has been adduced, and if this evidence be such as to warrant the conclusion, we are said to reason legitimately; if not, the reverse. Now, as no man ever assents to a judgment unless he deems its evidence conclusive, a case of false reasoning can only occur where the evidence, though seemingly just and sufficient, is, in reality, fallacious and deceptive; such an argument is called a *fallacy*.

§ 2. *Classification of Fallacies.*

The true way of comprehending any subject is—as we discovered when treating upon pure Logic—to arrange it in a system constructed upon the principles of logical division and classification. It, therefore, behoves us, if we would make a practical use of the science, to at once arrange the various fallacies under their respective heads, before proceeding to discuss them in detail.

Every syllogism consists of two parts, *form* and *matter:* this enables us to divide all fallacies into two great classes, viz., those whose inference is erroneous, through being informally

expressed ; and those where the premises legitimately imply the conclusion, if the *form* of the syllogism be alone regarded, but where an examination of the *matter* will show the reasoning to be invalid.

Formal fallacies are those which violate the syllogistic canons, and may be subdivided into as many co-ordinate species as there are proximate rules. It will only be necessary, however, for our purposes, to regard the faults of *undistributed middle* and *illicit process.*

Material fallacies may be erroneous, either as regards their terms, their premises, or their conclusion, and are consequently subdivided into these three subaltern genera, viz., *quaternio terminorum,* or syllogisms with four terms ; syllogisms with a *premiss unduly assumed ;* and *ignoratio elenchi,* or syllogisms which do not prove the required conclusion.

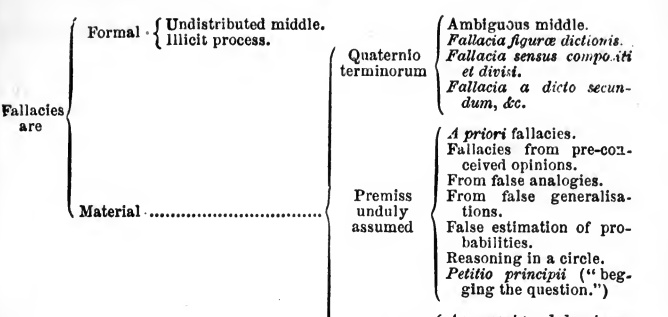
The species of these subaltern genera, may be arranged in accordance with the following considerations :—

1°. *Quaternio terminorum.* This fallacy may arise from the ambiguity of the middle term, so that in the major premiss one sense of the word is used, in the minor, another. Or, for any one of the terms, two words may be employed which are supposed to imply the same meaning, but do not. Or, again, a term may consist of several notions, these being taken together in one judgment, and separately in the other. Or, lastly, a term may be used absolutely in one judgment, and relatively in the other.

2°. *A premiss unduly assumed.* The causes of this may be,—considering certain truths as self-evident which are not so ; forming a judgment from some pre-conceived opinion, false analogy, or false generalisation ; over-estimating the weight of probabilities ; reasoning in a circle; or, taking for a premiss some proposition which is the same as, or implies, the conclusion.

3°. *Ignoratio elenchi.* This occurs whenever appeals are made to the passions, prejudices &c., of men ; when a part is proved instead of the whole ; &c., &c.

The foregoing division may be exhibited in a "scheme," as follows :—



Before we commence the discussion of each of the above fallacies in its order, it may be well to remark that the above division could only be logically perfect, provided we were allowed to make arbitrary distinctions between individual examples of false reasoning; for there are some fallacies which belong to one species equally as much as they do to another. This, in many cases, arises from the enthymematic mode of expression which obtains so universally: were a man, for example, in maintaining the efficacy of imprisonments for life, to argue that "capital punishment is improper," because "it does not tend to make the criminal a better member of society," we must either suppose him to hold that "*all* proper punishments are for the purpose of reformation, as regards the criminal's social behaviour," or that *some* are. In the former case, the complete syllogism would run thus:—

All proper punishments are intended for the criminal's social reformation,

Capital punishment is not so intended;

∴ Capital punishment is improper.

Here the formal reasoning is perfectly valid, but when the *matter* is examined, we see that the major premiss is unduly assumed; for, obviously, imprisonment for *life* is not intended to make the criminal a better member of society, as it starts with the condition that he shall never mix with his fellow-creatures again.

If we adopt the latter of the suppositions stated above, the argument will be as follows :—

Some proper punishments are intended for the criminal's social reformation,

Capital punishment is not so intended ;

∴ Capital punishment is improper ;—

where there is an illicit process of the major term, and, consequently, a formal fallacy.

In cases similar to the foregoing, it must always remain doubtful as to which class they belong ; and, therefore, the division adopted must be considered as only approximatively correct. This state of things, however, obtains in every science, and arises from the necessary imperfection of our knowledge : in chemistry, for instance, it is a moot point as to whether arsenic should be included amongst the metallic or non-metallic elements ; while, in biology, it is almost impossible to draw the line between animal and vegetable life. At the same time, most classifications are correct enough for all practical purposes, if not in strict accordance with the rigorous requirements of theoretical truth. Thus much premised, we shall now enter upon a detailed account of the various species of fallacies.

§ 3. *Formal Fallacies.*

These, as already stated, consist of such syllogisms as violate the canons which have been laid down for the purpose of determining the validity of an argument from its form. The principal species are Undistributed middle, and Illicit process. Examples may be thus given :—

Undistributed middle :—

Negroes are men,
Hindoos are men ;
∴ Hindoos are negroes.

Illicit process :—

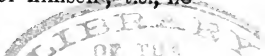
All planets revolve round the sun,
All planets are stars ;
∴ All stars revolve round the sun.

The subject of form has been so fully discussed in the preceding chapter, that it will not be necessary to add anything

further upon this point. The following observations, however, taken from Archbishop Whately's "Elements," are of great importance.

"To the present class [formal fallacies] we may the most conveniently refer those fallacies, so common in practice, of supposing the conclusion false because the premiss is false, or because the argument is unsound; and of inferring the truth of the premiss from that of the conclusion. *e.g.*, if any one argues for the existence of a God, from its being universally believed, a man might, perhaps, be able to refute the argument by producing an instance of some nation destitute of such belief; the argument *ought* then to *go for nothing:* but many would go further, and think that this refutation had *disproved* the existence of a God; in which they would be guilty of an illicit process of the major term: viz., 'Whatever is universally believed must be true; the existence of a God is not universally believed; therefore, it is not true.' Others again, from being convinced of the truth of the conclusion, would infer that of the premises, which would amount to the fallacy of an undistributed middle: viz., 'What is universally believed is true; the existence of a God is true; therefore, it is universally believed.' Or, these fallacies might be stated in the hypothetical form; since the one evidently proceeds from the denial of the antecedent, to the denial of the consequent; and the other, from the establishing of the consequent, to the inferring of the antecedent; which two fallacies will usually be found to correspond respectively with those of Illicit process of the major, and Undistributed Middle.

"Fallacies of this class are very much kept out of sight, being seldom perceived even by those who employ them; but of their practical importance there can be no doubt, since it is notorious that a weak argument is always, in practice, *detrimental*; and that there is no absurdity so gross which men will not readily admit, if it appears to lead to a conclusion of which they are already convinced. Even a candid and sensible writer is not unlikely to be, by this means, misled, when he is seeking for arguments to support a conclusion which he has long been fully convinced of himself; *i.e.*, he



will often use such arguments as would never have *convinced* himself, and are not likely to convince others, but rather (by the operation of the converse Fallacy) to *confirm*, in their dissent, those who before disagreed with him."

§ 4. *Material Fallacies: Quaternio Terminorum.*

1°. *Ambiguous middle.* This occurs whenever one sense of the middle term is employed in the major premiss, and another in the minor, thus—

Whoever is nervous is timid,
Hercules was nervous;
∴ Hercules was timid.

The word *nervous* is here used in two senses, viz., "timid" and "strong," and, consequently, the syllogism contains four terms, which, of course, renders it invalid. I have given an example in which the error may be easily perceived, but it must not be supposed from this, that all cases of ambiguous middle are of such a simple character. Indeed, there are many words of common use, which continually give rise to mistaken ideas in consequence of their ambiguity. Thus, the impression is very general, that the "*men of old*" were superior in wisdom and experience to those of modern times; this notion arising from the natural reverence which we feel for the opinions of "*old men*," in consequence of their longer life having enabled them to form a better judgment of the world's course than younger men can do. Of course, when the syllogism is fully expressed—"Old men are worthy of reverence; these men are men of old; therefore, these men are worthy of reverence"—we see at once that the word *old* is used at one time in the sense of *aged*, and at another, as signifying *removed from us by length of time;* and that, accordingly, the reasoning is inconsequent; but then we must remember that arguments, in practice, are elliptical, the premises being oftener hinted at, than articulately stated. A skilful sophist, therefore, will avoid anything like a definition of the terms he employs, or a full expression of his inference; trusting to the various associations, traditions, and prejudices of his hearers to supply such ideas as may be best

calculated to lead them to the desired conclusion. And in like manner, it follows that the most effectual remedy against fallacies of this description, is to insist upon a precise explanation of the sense in which each term is used. That this caution is not unnecessary, will easily be seen if we reflect upon the great number of words which are susceptible of duplicate, triplicate, &c., interpretations; *e. g.*, *law* may mean either a command for persons to obey, or a general expression for a group of physical facts; *same* implies identicality, and also great similarity; *may* and *can*, sometimes signify liberty, and sometimes possibility, &c., &c.

2°. *Fallacia figuræ dictionis.* It frequently happens that *paronymous* words, *i.e.*, those which have a grammatical relation to each other in consequence of their springing from the same root, differ considerably in meaning, but yet in the haste of an argument are assumed to be of similar import. This produces what the old logicians have termed the *fallacia figuræ dictionis*, and is dangerous on account of the many variations which may be, and commonly are, given to a term in the course of a chain of reasoning, without infringing the validity of the conclusion. Thus, it would be perfectly allowable to say, "Wherever a lighted candle maintains great luminosity, the atmosphere is respirable; in this well a lighted candle continues to be very luminous; therefore, here the atmosphere is respirable;" for the expressions "to maintain luminosity" and "to continue luminous" are justly treated as equipollent: but were we to say, "No designing persons are honest; all sculptors design; therefore no sculptor is honest," we should in reality employ four terms; "designing" meaning *scheming* or *plotting*, while "to design" implies the *conception of some idea to be executed by an artist.*

The proper method of combating this fallacy consists in an explanation of the different senses attaching to the paronymous words.

3°. *Fallacia sensus compositi et divisi.* This, which is also termed the fallacy of composition and division, is produced whenever a term is used in one judgment *collectively*, and in the other *distributively*. A simple example is as follows:—

"Five and two are odd and even; seven is five and two; therefore, seven is odd and even." Here "five and two" means in the major premiss, those numbers alluded to distinctly and respectively; in the minor, the same taken together; accordingly, there is a case of *quaternio terminorum.*

Perhaps the most frequent method of employing fallacies of this description, is when a truth which has been separately established concerning many individual notions is sought to be inferred of them all collectively. Thus it is occasionally argued, that because the ordinary alterations of temperature produce comparatively little effect upon the physical configuration of the earth's surface, and because the same thing may be asserted of each of the natural disintegrating and abrading powers, such as tides, rivers, rain, glaciers, &c., therefore the combined operation of all together would not do more, and, consequently, that we must assume some grand cataclysm as the cause of such great changes as may be apparent.

In all cases of probability there is often a tendency to fall into the error now under consideration, and this tendency is in opposite directions. Suppose we are told that it is an even chance whether the disease upon reaching a certain stage will kill the sufferer or not; and, also, that it is an even chance whether the disease will reach that stage; we are apt to conclude that an even chance results of the person dying or not dying; whereas the chances are three to one against his dying. This is rendered evident as follows: the chance of the disease reaching a certain point is one-half of all the possible changes which may supervene; but the chance of dying is only one-half of *these, i.e.*, one-quarter of the possible cases; therefore the chance of not dying is three-quarters, or in the ratio of three to one. Here the probability was over-estimated, but in many instances the reverse is the case: thus, if we were to argue, that because it is improbable that the *whole* of Newton's discoveries were the results of fortunate coincidences, it is, therefore, improbable that *any one* of them was so, we should commit this error.

Archbishop Whately under this head describes what he terms the *thaumatrope* fallacy; this consists in presenting

several incompatible notions to the mind in quick succession, so as to induce the belief that they might exist together. After the Crimean war, for example, a statement was published showing the several objects which the money spent might have separately accomplished. Now, in all probability, many persons on reading the long list, and finding that this, that, and the other thing might have been done, left off with the idea that *all* of these objects together were capable of realisation.

4°. *Fallacia a dicto secundum, &c.* These fallacies arise when we conclude absolutely of a notion what is true of it only under certain circumstances; and when we conclude relatively what is only true when absolute; the latter is sometimes termed *fallacia accidentis.*

Persons occasionally fall into this error when arguing against capital punishment, forming their syllogism thus:—

To return evil for evil is wrong,
Capital punishment is returning evil for evil;
∴ Capital punishment is wrong.

Here the major premiss is only true under certain qualifications; that is to say, a revengeful *animus* is supposed in combination with returning evil for evil; whereas in the minor, the action is considered in the abstract, and without any such attendant circumstance.

Again, uneducated people are greatly astonished upon being told that the earth is nearer to the sun in winter than in summer, for their thoughts immediately run in this fashion; "the nearer we are to a hot body the warmer we must be, and therefore the earth ought to become warmer instead of colder on approaching the sun." The mistake, of course, lies in their ignorance of the fact that we only get warmer upon approaching a hot body *provided that* the rays of heat continue to strike us at the same, or at a more favourable angle.

Fallacies of this nature are very difficult to detect, in consequence of the readiness which exists to lose sight of the limitations which alone render a general law capable of being applied to some particular case. The best method of treatment is to require a rigid proof of both premises, which will always

exhibit whether the inference is legitimated by the circumstances of the case.

The false reasonings which have been described above are the principal fallacies belonging to the genus of *quaternio terminorum;* but there are many various ways of sophistication by means of ambiguity in expression, which, though not syllogistic, are often employed. Such is the practice of asking a question that may be susceptible of various interpretations according to the answer given; *e.g.*, an opponent of free-will might ask, "Am I free to do as I please?" and, being answered in the affirmative, would reply, "Then I am at liberty to kill you and half-a-dozen more if I so please." If answered in the negative, he would at once say, "Then I am controlled by necessity, and am not a free-agent." In this instance the ambiguous word is "free," which in one case is held to mean "free as regards nature;" in the other, "free as regards the laws of society." The student will have no difficulty in forming the corresponding syllogisms.

Perhaps, however, the most celebrated fallacy depending upon the ambiguity of a word, is the sophistical puzzle of Achilles and the tortoise. Its enunciation and solution are given by Mr. Mill as follows:—

"The argument is, let Achilles run ten times as fast as the tortoise, yet if the tortoise has the start, Achilles will never overtake him. For suppose them to be at first separated by an interval of a thousand feet: when Achilles has run these thousand feet, the tortoise will have got on a hundred; when Achilles has run those hundred, the tortoise will have run ten; therefore, Achilles may run for ever without overtaking the tortoise.

"Now, the 'for ever' in the conclusion, means, for any length of time that can be supposed; but in the premises 'ever' does not mean any *length* of time: it means any *number of subdivisions* of time. It means that we may divide a thousand feet by ten, and that quotient again by ten, and so on as often as we please; that there never needs be an end to the subdivisions of the distance, nor, consequently, to those of the time in which it is performed. But an unlimited number of subdivisions may be made of that which is itself limited.

The argument proves no other infinity of duration than may be embraced within five minutes. As long as the five minutes are not expired, what remains of them may be divided by ten, and again by ten, as often as we like, which is perfectly compatible with their being only five minutes altogether. It proves, in short, that to pass through this finite space requires a time which is infinitely divisible, but not an infinite time."

Another example of the same fallacy may be thus given: If at present we look forward into eternity we see that the duration yet to come is infinite; but the same state of things will obtain a hundred years hence, and as two infinite durations must be equal to each other, the futurity then, and the futurity now cannot differ; therefore the hundred years constitute no lapse of time whatever, as otherwise there would be a difference of so much between the periods in question. Thrown into a syllogistic form the argument would stand as follows:—

Two infinite durations are equal to each other,
The present futurity, and the present futurity less a hundred years, are two infinite durations;
∴ The present futurity is equal to the same, less a hundred years.

Here the major premiss involves a contradiction in terms, for it implies that two *incommensurable* things (*i.e.*, two different *infinities*) are *commensurable;* it is, therefore, inadmissible. Or the solution might pass were we to say that the middle term is ambiguous, meaning in the major premiss, "two infinite durations starting from the *same point*," and in the minor, "two infinite durations starting from *different points*."

§ 5. *Material Fallacies: Premiss unduly assumed.*

1°. *A priori fallacies.* We have now to consider those errors which arise from the assumption of a premiss, either without any proof at all, or without such proof as would be considered sufficient by both parties, if they were equally apprised of the questions at issue. And first, of those cases where there is no proof whatever of the assumed premiss.

As an essential preliminary, it must be remarked that there are some truths which we do not attain by any reasoning process,* and which, therefore, are not susceptible of proof. Thus, when a piece of brass engages my attention, I am conscious of some change which takes place in my mind, and this change I call the *sensation of yellow*, applying the name *yellow* to those attributes of the brass which produced the sensation; therefore, when I say, "This brass is yellow," I cannot abstractedly prove the statement, as I am merely asserting a subjective fact, of whose existence I alone can judge, and which is only granted by my opponent in consequence of his being affected by similar sensations. Accordingly, such truths are termed *self-evident*, and must form the foundation of all reasoning.

This consideration is the clue which guides us to the source of the particular class of sophisms at present under investigation. Men, finding that certain of their sensations correspond with outward facts, go further, and imagine that whenever any subjective state of consciousness is ascertained, there must always exist a correlative condition of the objects about which thought is concerned. Thus, Philolaus and the Pythagoreans, imagining that the nature of fire was more incomprehensible than that of earth, and feeling that whatever they could least comprehend impressed their minds with the greatest sensations of awe, concluded that fire in itself was more capable of majesty than earth, and in the disposition of the universe would occupy the most worthy place. Accordingly, they conceived that there existed in the centre of the universe a mass of fire termed the "Altar of Nature," and that, at distances varying with the different degrees of fiery composition, were ranged the heaven containing the fixed stars, the planets, and all other cosmical bodies.

Perhaps the most prevalent class of *à priori* fallacies is that which results from an inspection of the imaginative powers, it being assumed that objective existence is dependent upon

* A practical view. Compare with this the section upon Observation.

the possibility or impossibility of its being conceived by us. Dr. Clarke, for instance, in a correspondence with Bishop Butler, makes use of the following expression, "The *supposing* anything possibly to exist alone, so as not necessarily to include the pre-supposal of some other thing, *proves* demonstrably that that other thing is not necessarily existing; because whatever has necessity of existence cannot possibly, in any conception whatsoever, be supposed away." Here the statement is implied that because we *cannot conceive* it, therefore, no necessary existence can be apart from or independent of any other existence; this, of course, being an arbitrary assumption that the laws of our minds regulate the facts of nature.

Again, one of the most celebrated modern systems of philosophy was based upon this error; viz., that of Descartes, concerning whom Mr. Mill speaks thus:—"His favourite device for arriving at truth, even in regard to outward things, was by looking into his own mind for it. 'Credidi me,' says his celebrated maxim, 'pro regulâ generali sumere posse omne id quod valdè dilucidè et distinctè concipiebam, verum esse:' whatever can be very clearly conceived must certainly exist; that is, as he afterwards explains it, if the idea includes existence. And on this ground he infers that geometrical figures really exist, because they can be distinctly conceived. Whenever existence is 'involved in an idea,' a thing conformable to the idea must really exist—which is as much as to say, whatever the idea contains must have its equivalent in the thing; and what we are not able to leave out of the idea cannot be absent from the reality. This assumption pervades the philosophy not only of Descartes, but of all the thinkers who received their impulse mainly from him, in particular the two most remarkable among them, Spinosa and Leibnitz, from whom the modern German metaphysical philosophy is essentially an emanation."*

Locke, too, founds his proof of the existence of a God upon the considerations, that as (self-evidently) nothing cannot produce any real being, something must have existed from all

* "Logic," book v. chap. iii. § 3.

eternity; and that this something must be a cogitative being, because it is as impossible to conceive that every bare incogitative matter should produce a thinking intelligent being, as that nothing should of itself produce matter. This reasoning hinges upon the supposition that "what is inconceivable is impossible," a proposition which is continually being disproved as knowledge advances, and our means of investigation become greater. In fact, that great truth which is ever present with us—the action of mind upon matter—should of itself suffice to overthrow all reliance upon any *necessary* connection between subjective and objective existences.

An ordinary case of the operation of the above fallacy is to be found in the reception accorded to any account of wonderful events. Take, for example, the case of mesmerism, or spirit-rapping. One person cannot conceive the possibility of the facts being produced by ordinary means, and, *therefore*, assumes that they must be the results of supernatural agency; while another, not being able to imagine that immortal beings would, or that mortals could, give rise to such events, concludes that these cannot have occurred. In each extreme an erroneous inference takes place, founded upon a premiss unduly assumed.

Another duplicate group of errors is based upon the suppositions that nothing can be true unless some reason can be assigned for it, and that everything must be true if there exist no reason against its being so. To the former may be referred the usual objection of "*cui bono?*" which assumes that an objective fact does not exist if its practical uses are not immediately observable. To the latter belong most of the *à priori* demonstrations of physical truths, one of the best known being Duchayla's proof of the composition of forces, which rests upon the axiomatic statement that "the resultant of two forces meeting at a point, must bisect the angle between them." This is said to be self-evident, "*because we can assign no reason* why the resultant should incline to one force rather than to the other." Here, as all *à priori* reasoning is necessarily anterior to experimental knowledge, we cannot be certain but that something may exist in the natural action of two forces upon each other, which shall invariably

incline their resultant to the right or to the left; nor can any reason be assigned for the resultant bisecting the angle, rather than inclining to one of the forces. The first step, therefore, of the proof being unfounded, the remaining portions are untenable; and, indeed, it would appear generally true, that the only valid reasoning with reference to physical facts is such as may be deduced from experiment, *i.e.*, such as is *à posteriori*.

A very ancient example of the fallacy which we have just considered is to be found in the astronomical doctrines of Anaximander, who flourished at the commencement of the sixth century, B.C. He held that the earth was suspended immovably in space, *because** "being equidistant from the containing heaven in every direction, there was no reason why it should move in one direction rather than in another."

There remains but one more species of *à priori* fallacies to which I shall allude, viz., those arguments which rest upon the suppositions that an effect has but one cause, and that causes must resemble their effects. Thus, Plato,† in one of his dialogues, makes Socrates give an account of an investigation into the causes of things, which results in the conclusion that every phenomenon has its own single and separate cause—a substance being red, because a certain abstract "redness" dwells in it; large, because an abstract "magnitude" is present; small, on account of "littleness;" and so on. This opinion pervaded all philosophy until the days of Bacon, who, by his advocacy of experiment, led the way towards the admission that the same effects may be produced by different causes. At the same time, however, it is to be remarked that even Bacon himself was not altogether free from these errors, inasmuch as in his celebrated inquiry concerning the "form," or nature of heat, he assumes that the sensation of heat is always caused by the same set of conditions or attributes, whereas we now know that intense cold (and other causes) will produce a similar effect as far as our feelings are concerned. He also imagines that there must be

* Sir G. C. Lewis's "Astronomy of the Ancients," chap. ii. § 5.
† "Phædo," § 103.

a *resemblance* between causes and effects, for we find him speaking as follows :*—"Heat is a motion of expansion, not uniformly of the whole body together, but in the smaller parts of it; and at the same time checked, repelled, and beaten back, so that the body acquires a motion alternative, perpetually quivering, striving and struggling, and *irritated by repercussion*, whence springs the *fury* of fire and heat." Hence it is that, although very near the mark, he has yet failed to obtain a clear and comprehensive notion of heat, for he says,† "Again, it [that heat is a motion of constituent atoms, not of constituted bodies] is shown in this, that when the air is expanded in a calender glass, without impediment or repulsion, that is to say, uniformably or equably, there is no perceptible heat. Also, when wind escapes from confinement, although it burst forth with the greatest violence, there is no very great heat perceptible, because the motion is of the whole, without a motion alternating in the particles." Here, from the assumption that the *sensation* of heat must always be produced by heat, he concludes the absence of the latter in cases where we know it is really present. The reason, then, of Bacon's failure would appear to be that he confined himself to the investigation of the nature of that set of conditions which are capable of producing the sensation of heat; whereas he should have endeavoured to ascertain the number of different effects which might be produced by the action of heat: "the power of artificially producing an effect," as Mr. Mill says,‡ "implying a previous knowledge of, at least, one of its causes. If we discover the causes of effects, it is generally by having previously discovered the effects of causes."

I have considered these *à priori* fallacies at some length, in consequence of their universal influence, and small liability of detection. The remedy is to deny the self-evidence of the assumed principle, and require a proof.

2°. *Fallacies from pre-conceived opinions.* It often happens that men are content to accept, as established truths, assertions whose only foundations are derived from their

* "Nov. Org.," book ii. Aph. 20. Spedding's Trans. † Ibid.
‡ "Logic," book v. chap. iii. § 7. Compare with preceding remarks.

consonance with some pre-conceived opinion, or from a hasty inspection of the facts involved. And in cases where an intentional piece of sophistry is employed, the most successful plan is to mention the premiss as something wonderful and surprising; the effect of which is that our attention is no longer directed to the question of the proposition's truth or falsity, but rather to the best method of *accounting* for the *fact*.* Thus, the Royal Society were, for a long time, puzzled by King Charles II.'s inquiry, as to the reason why a *dead* fish will not add to the weight of a vessel of water, although a *live* fish will; and it was not until after many vain attempts to discover a solution of this marvel, that the philosophers remembered that there might be a doubt as to whether it existed at all.

Most cases of superstitions may be referred to this head; that is to say, most instances of superstitious belief producing any effect upon the mind. How many reputed supernatural appearances would have been investigated, and their real nature detected, if the prevalent belief that such events were of frequent occurrence, had not precluded the necessary examination! And even to the present day, there are persons to be found in provincial districts, who will attribute any sudden misfortune to the operation of witchcraft, simply because they have always understood that this power was the usual cause of similar events; never deeming it necessary to ascertain the truth of the tradition.

Indeed, there would seem to exist some faculty in the mind which renders us disposed to accept whatever is handed down in the shape of tradition, the more especially if it be of prodigious and marvellous import. Possibly the fact is, that the majority have a great disinclination to exert their mental powers more than is absolutely required for the proximate objects of their pursuits; and, consequently, they regard with disfavour any attempt to disabuse them of erroneous opinions, as such a course would necessarily involve the exertion of accustoming themselves to new methods of belief.

3°. *Fallacies from false analogies.* Analogy is, properly

* Compare Whately's "Logic," book iii. § 14.

speaking, a "resemblance of relations;" and when "we argue from analogy," we assert that two objects which resemble each other in one point, will also resemble each other in another point, which depends in both cases, by a similar relation upon the first. Thus, we conclude that ammonium is a metal, because it resembles other metals in its formation of an amalgam with mercury; that is to say, the relation between the constituents of each amalgam, being precisely similar, we infer that they are severally composed of mercury, in combination with a metal. But were we to infer that sulphur is a metal, because heat vaporises it as well as all metallic substances, we should be employing a false analogy, because the relation of vaporisation does not necessarily determine the presence of a metal in conjunction with heat.

Accordingly, a fallacy of false analogy may be considered to exist wherever from a resemblance in one point is inferred a resemblance in another, without, at the same time, its being shown that there exists a similarity of relations between the two points.

Professor De Morgan notices the following prominent instances of this fallacy* :—"All the makers of systems, who arrange the universe, square the circle, and so forth, not only comfort themselves by thinking of the neglect which Copernicus, and other real discoverers, met with for a time, but sometimes succeed in making followers. These last forget that for every true improvement, which has been for some time unregarded, a thousand absurdities have met that fate permanently. It is not wise to toss up for a chance of being in advance of the age, by taking up at hazard, one of the things which the age passes over. As little will it do to despise the usual track for attaining an object, because (as always happens) there are some who are gifted with energies to make a road for themselves. Dr. Johnson tells a story of a lady who seriously meditated leaving out the classics in her son's education, because she had heard Shakspeare knew little of them. Telford is a standing proof (it is supposed by some) that special training is not essential for an engineer."

* "Formal Logic," p. 276.

In Plato's "Dialogue upon the Immortality of the Soul," Simmias objects that, according to Socrates' account, the soul is a harmony of the body, and that therefore, it will be destroyed when the body is, in the same manner as the harmony of a lyre ceases when the lyre is broken. But Socrates shows the fallacy of this argument, by pointing out that the same relation does not obtain between the soul and body, as between the lyre and its harmony; for, as had been previously granted, the soul exists before the body, and is, therefore, independent of it, while the harmony of any particular lyre cannot exist until the instrument is constructed, and accordingly perishes when it is destroyed.

The records of ancient astronomy abound with examples of fallacious analogies. The Pythagoreans, for instance, are reported by Aristotle, to have conceived that ten was the only perfect number, and, therefore, the number of bodies revolving round the central fire must also be ten. But nine only were visible to them; viz., the sun, the moon, the earth, the five planets, and the sphere of fixed stars; accordingly, they imagined another, which they termed the antichthon, and declared to be invisible from the earth, as it was upon the opposite side to the inhabited portion. In like manner, the distances of the several orbits were assumed to increase constantly, in the ratio of three to one, a calculation which made the sun's distance from the centre 729: this number being both a square and a cube, the sun also was said to be a square and a cube. "Finding that the distances of the planets bore, or seemed to bear to one another, a proportion not varying much from that of the divisions of the monochord, they inferred from it the existence of an inaudible music, that of the spheres: as if the music of a harp had depended solely on the numerical proportions, and not on the material, nor even on the existence of any material—any strings at all. It has been similarly imagined that certain combinations of numbers, which were found to prevail in some natural phenomena, must run through the whole of nature: as that there must be four elements, because there are four possible combinations of hot and cold, wet and dry; that there must be seven planets, because there were seven

metals, and even because there were seven days of the week. Kepler, himself, thought there could be only six planets, because there were only five regular solids."* Nor must it be imagined that these fantasies are confined to the olden times, for I, myself, have heard a clergyman seriously maintain, from the pulpit, that the number seven must be sacred in its nature, because it is composed of three and four; the former representing the Holy Trinity; the latter, man and nature, all of whose attributes and members are regulated by twos and fours.

"Another example is the not uncommon *dictum*, that bodies politic have youth, maturity, old age, and death, like bodies natural—that after a certain duration of prosperity they tend spontaneously to decay. This also, is a false analogy, because the decay of the vital powers in an animated body, can be distinctly traced to the natural progress of those very changes of structure, which, in their earlier stages, constitute its growth to maturity; while in the body politic, the progress of those changes cannot, generally speaking, have any effect but the still further continuance of growth: it is the stoppage of that progress, and the commencement of retrogression, that alone would constitute decay. Bodies politic die, but it is of disease, or violent death: they have no old age."†

Fallacies of false analogy may be shown to be erroneous, by proving that there is no causative connection between the resemblance observed and the resemblance inferred; or, in other words, that it does not necessarily follow that they must always co-exist.

4°. *Fallacies from false generalisations.* Numerous causes exist, which lead us to infer universal propositions where only particular ones are warranted by the facts of the case. Memory itself is an active agent in promoting this error; as, for instance, in the case of predictions being verified, marvellous coincidences, and the like, we only remember those occurrences where the prediction was fulfilled, or where some result followed the coincidence, and entirely forget those of

* Mill's "Logic," book v. chap. v. § 6.
† Mill's "Logic," book v. chap. v. § 6.

the contrary nature. We then enumerate the remembered cases, and conclude that the prophet is a true one, and that the coincidence is an example of cause and effect.

This fallacy often assumes a dilemmatic form, and was in constant use among the ancient Greek logicians, when engaged in their disputative tournaments. A celebrated instance is the following, which endeavours to show, from the argument of necessity, that it is of no use to strive against any occurrence, fortunate or unfortunate.

If I ought to exert myself to effect a certain event, this event either must take place or it must not;

If it must take place, my exertion is superfluous; if it must not, my exertion is of no avail;

∴ On either alternative, my exertion is useless.

Here, in the major premiss, it is assumed that for the event to take place necessarily, and for it not to do so, are all the cases possible. But this enumeration is imperfect, as the event taking place may depend upon my own exertions; and therefore, the alternative member of the premiss should be, "This event must either take place through my own exertions, or through some other cause, or not at all."

Occasionally, the answer to a dilemma is to "retort" it; *i.e.*, to propose one which shall be correlative and reciprocal. The best known of these cases is called the *litigiosus*. Sir William Hamilton's account is as follows:—"It relates to an action between Protagoras, the prince of the sophists, and Euathlus, a young man, his disciple. The disciple had covenanted to give his master a large sum to accomplish him as a legal rhetorician; the one half of the sum was paid down, and the other was to be paid on the day when Euathlus should plead and gain his first cause. But when the scholar, after the due course of preparatory instruction, was not in the same hurry to commence pleader, as the master to obtain the remainder of his fee, Protagoras brought Euathlus into court, and addressed his opponent in the following reasoning:—'Learn, most foolish of young men, that however matters may turn up (whether the decision to-day be in your favour or against you), pay me my demand you

must. For, if the judgment be against you, I shall obtain the fee by decree of the court, and if in your favour, I shall obtain it in terms of the compact, by which it became due on the very day you gained your first cause. You thus must fail, either by judgment or by stipulation.' To this Euathlus rejoined:—'Most sapient of masters, learn from your own argument, that whatever may be the finding of the court, absolved I must be, from any claim by you. For, if the decision be favourable, I pay nothing by the sentence of the judges, but if unfavourable, I pay nothing in virtue of the compact, because, though pleading, I shall not have gained my cause.' 'The judges,' says Gellius, 'unable to find a *ratio decidendi*, adjourned the case to an indefinite day, and ultimately left it undetermined.'"

The "horned" dilemma is also a much-renowned fallacy. It consists of the question, "Have you cast your horns?" to which, if you answer "No," I reply, "Then you have them still:" if you answer "Yes," I reply, "Then you have had horns." The error here is the assumption that you must either have had horns and cast them, or have had them and retained them; whereas, another case is possible, viz., the fact that you have never had them.

Another example is the fallacy of continuous questioning, to which the name of *sorites* is often applied. It is thus employed:—The sophist asks whether a man with so many thousand hairs on his head is bald. You answer, "No;" and are next asked whether if he had one hair less he would be bald. The same reply being given, a further diminution of one hair takes place, and so on, until you are either forced to admit that you cannot distinguish between bald and not-bald, or that they differ by a single hair. The reasoning is based upon the supposition that a man must either be bald or not-bald, whereas he may be both: and this refutation does not involve a contradiction in terms, as at first it would seem to do, for "bald" and "not-bald" being relative terms, may, when their correlatives differ, be both applied to the same object. Of course, an *exact* method of evading the sophism would be to regard "bald" as meaning entire destitution of hair; in which case there would be no absurdity in

maintaining that a single hair constituted the difference between bald and not-bald.

These will serve as a specimen of the fallacies invented by the Greeks for purposes of recreation. We will now consider the practical forms in which false generalisation appears among the ordinary reasoning processes of philosophy and common life.

The *non causa pro causa* is an error of very wide extent, and consists in imagining a causal relation between two facts which happen to occur either at the same time, or within some short interval of one another. Thus, the ancients imagined that anything which apparently moved of itself was animated, since they had observed voluntary motion to be accompanied by life in many cases: accordingly, they assumed that the stars were animated. Here, from observing a coincidence, they inferred a causal relation, and so laid down a general law which, false in itself, was the parent of many kindred errors when applied to scientific speculations. So, too, from the fact that wars or pestilences have happened soon after the appearance of a comet, it has been held that heavenly bodies of like description are the causes, or at least precursors of great calamity. In this case, a sequence was considered as a relation of antecedent and *consequent;* the technical name for such a fallacy being *post hoc, ergo propter hoc*, while the former is called *cum hoc, ergo propter hoc.*

It is not, however, to be supposed that all examples of this fallacy are of such a simple description. Thus, a country is often said to be prosperous *because* it is rich, whereas in fact, it is rich because it is prosperous: or the government and constitution must be praiseworthy, because under them the country has flourished, the truth being that it has flourished *in spite* of them.

The want of sufficient investigation frequently leads to false generalisation: iron, for instance, was supposed to be rusted whenever it came into contact with water; recent experiments have, however, determined that air, and probably carbonic acid, are also necessary to the production of this effect. Oxygen, as is imported by its name, was considered the active principle of all acids, merely because it was a

constituent of such as were then known analytically: the doctrine was but short-lived, owing to the discovery that many acids contained no oxygen whatever. And this will always be the case, where efforts are alone directed to discover the points of similarity between various bodies, instead of the attempt being made to ascertain the properties wherein they differ.

"Experience" has also much to account for as an erroneous guide: no public vehicle had been made to run at more than ten or twelve miles the hour; therefore, to travel quicker by railway could never take place. A certain law has hitherto worked well; therefore, it will never require alteration: the swans that had been seen before the discovery of Australia were white; therefore, there were no black ones. No person had met with birds without wings; consequently, until the *apteryx* was found in New Zealand, the notion obtained that all birds were thus provided; and so on, the love of dogmatising from truths within our observation to facts beyond it, being irresistible.

Of a similar nature is the employment of general propositions as such, which are only the result of a majority of cases: estimates of national character, for instance, when applied to an individual case, cannot give a correct *inference*, although, of course, the conclusion may possibly be true. When I say the Hindoos are Pagans, I mean only that most of them are so; and, therefore, were I to declare that this man is a Pagan because he is a Hindoo, my syllogism would either be invalid, the middle being undistributed, or the major premiss would be unduly assumed.

5°. *Fallacies from a False Estimation of Probabilities.* A premiss which in itself is only probable, is not uncommonly assumed as certain; or, should it be just possible, it is taken as probable. The degrees of probability are also unduly increased in many arguments, more especially where the reasoning takes the form of a sorites or epicheirema. Thus, if we were to argue that since earthquakes are possibly caused by sudden formations of steam within the earth, and since the intrusion of fused rocks and other highly heated matter into cavities filled with water would probably occasion

such bursts of steam, therefore, the probable existence of internal lakes may be inferred, we should vastly over-estimate the chances involved. So, "one of the great fallacies of evidence is the disposition to dwell on the actual possibility of its being false; a possibility which must exist when it is not demonstrative. Counsel can bewilder juries in this way until they almost doubt their own senses. A man is shot, and another man, with a recently discharged pistol in his hand, is found hiding within fifty yards of the spot, and ten minutes of the time. It does not follow that the man so found committed the murder; and cases have happened, in which it has turned out that a person convicted upon evidence as strong as the above, has been afterwards found to be innocent. An astute defender makes these cases his prominent ones; he omits to mention that it is not one in a thousand against whom such evidence exists, except when guilty." *

The chance of deception in such cases must depend, in a great measure, upon the capacity of the parties to decide upon the proper weight to be given to each probability. If numerical values can be assigned to the various statements, the conclusion is merely a matter of arithmetical computation, but it would seldom be feasible to obtain the consent of an opponent to such a course. Accordingly, the best plan is to require that each proposition shall be expressed in one of these forms—"A is more likely than not, to be D," or, "A is less likely than not, to be D:" it is a simple matter then to arrive at a satisfactory result.

6°. *Fallacy of Reasoning in a Circle.* This fallacy arises whenever one of the premises is the same in sense with the conclusion, and it is scarcely necessary to point out that its unfairness consists in the fact of assuming as already proved (*i.e.* as a premiss) the very thing which you are about to prove, viz., the conclusion. An argument might, for example, be maintained in the following manner:—"Light is certainly material, for it adds to the weight of any body which absorbs it, although in so slight a degree as to escape perception by our most exact means of investigation.

* De Morgan's "Formal Logic," pp. 275-6.

And that it does so add to the weight results from the considerations that all matter is ponderable to some extent at least, and that when any substance is absorbed by another, the ponderosity of the former is necessarily added to that of the latter." If this train of reasoning were extended by a judicious introduction of illustrative examples of each statement, with elaborate analyses of the various principles involved, it might very possibly escape the observation of many readers, that to mention in such connection the case of one *substance* being absorbed by another, is, in reality, to assume the conclusion, *i.e.*, that light is material.

7°. *Petitio Principii* is a modification of the foregoing, and occurs when the faulty premiss is "proved from the conclusion, or is such as the persons you are addressing are not likely to know, or to admit, except as an inference from it, as *e.g.*, if any one should infer the authenticity of a certain history, from its recording such and such facts, the reality of which rests on the evidence of that history." *

This fallacy is more dangerous than that of reasoning in a circle, from the circumstance that the premiss merely *depends upon*, and does not *explicitly state* the conclusion; consequently, it often requires a minute and searching investigation to detect the error. Hence we cannot be surprised upon discovering that many philosophers whose acuteness and intellectual power stand almost unrivalled, have yet fallen into the snare of *petitio principii*, or, in other words, have "begged the question" at issue. "Plato, in the "Sophistes," attempts to prove that things may exist which are incorporeal by the argument that justice and wisdom are incorporeal, and justice and wisdom must be something. Here, if by *something* be meant, as Plato did in fact mean, a thing capable of existing in and by itself, and not as a quality of some other thing, he begs the question in asserting that justice and wisdom must be something." †

It has, indeed, been urged that every syllogism is a case of the *petitio principii*, since the truth of the major premiss

* Whately's "Logic," book iii. § 13.
† Mill's "Logic," book v. chap. vii. § 2.

depends upon the truth of the conclusion. Thus, in this argument—

All horses are quadrupedal,
Bucephalus is a horse;
∴ Bucephalus is quadrupedal;—

it is objected that before we can assert *all* horses to be quadrupedal, it must be true that Bucephalus is so. To discuss the question involved would here, however, be out of place; but those students who may wish for any further information upon the subject will find such in the Appendix, Article D.

A common method of expressing the *petitio principii* is to employ words, which, although synonymous, are yet of different etymology and derivation. A happily-chosen example is thus given by Archbishop Whately: "To allow every man an unbounded freedom of speech must always be, on the whole, advantageous to the state; for it is highly conducive to the interests of the community, that each individual should enjoy a liberty perfectly unlimited, of expressing his sentiments."

The remedy for the last-mentioned fallacies consists in cutting down the chains of reasoning as much as possible, so as to bring the erroneous premiss and the conclusion into close juxtaposition, when it will not be a matter of any difficulty to discern their relation and inter-dependence.

§ 6. *Material Fallacies. Ignoratio Elenchi.*

1°. *Argumenta ad hominem, &c.* The passions and prejudices of men having an enormous influence over their reasoning powers, a skilful sophist will often, by appealing to some particular bias, convince his hearers that such and such a proposition is perfectly correct, and then maintain that being so it must be received as universally true. Now, in doing this he has merely proved the conclusion partially, *i.e.*, in so far only as his hearers are concerned; whereas he should have proved it generally, and as applicable to all classes. Accordingly, he is guilty of an ignorance or evasion of the required proof (*elenchus*), this being the distinguish-

ing characteristic of the class of errors at present under examination.

There are three principal heads contained under the first division of this class, viz., the *Argumentum ad hominem*, the *Argumentum ad verecundiam*, and the *Argumentum ad populum*. Of these, the first consists in unfairly appealing to the opinions, &c., of the individual addressed; the second, in similarly addressing the reverence entertained for old institutions and the like; the third, in apparently determining the question by exciting the passions and fancies of the populace. Thus, I might go to one man whom I knew to be a disbeliever in the results of geological science, and compel him to admit that coal could not have required vast ages for its production, by arguing that the world itself had only existed for six thousand years; this would be an appeal *ad hominem*. Again, I might go to another, and succeed in establishing the same conviction, by reminding him that surely he would never think of setting his opinion up against what had been maintained by men of such learning and genius as so and so, and so and so; here I should address my argument *ad verecundiam*. Or, I might carry this point with a mob, by telling them that the contrary opinion was only upheld by those men who were always endeavouring to deceive the poor, and to take the bread out of the labourer's mouth by new-fangled inventions, which would be an *argumentum ad populum*.

2°. *Substituting a Part for the Whole.* When a universal proposition cannot be established, it often gains admittance by the proof of its corresponding particulars. Thus, with regard to the various sciences it is frequently urged that *none* of the principles are trustworthy, *because* there has always been a difference of opinion as to facts and theory between even the most renowned philosophers. Here the assertion is true in a measure, for *some* facts and theories have undoubtedly given rise to continual discussion; but, then, we must not lose sight of the fact that investigators of all parties and shades of opinion are in perfect agreement as regards the *major portion* of the respective sciences. And this form of *ignoratio elenchi* has a still commoner modification, viz., the assumption which persons frequently make, that upon *their own* preconceived

opinions, men of science are at variance, because controversy exists as to other doctrines; this being, not an inference of the whole from a part, but of one part from another. As might be expected from its recent development, the science of geology is greatly exposed to these mistaken notions; and in reference thereto, Sir Roderick Murchison has made the following valuable observations:—"In all the grand leading *data* on which the history of geology is based, we [himself and Sir C. Lyell] are *completely united;* whether it be in recording the regular succession of formations from the oldest to the youngest, the progression from lower to higher types of life, the enormously long periods which must have elapsed in the formation of deposits, and their frequent change into crystalline conditions by that metamorphism which he has so skilfully expounded; or, lastly, in the evidences he has brought together to show that man must have coexisted with some of the great fossil mammalia. On all these subjects I hold the same opinions as himself; and I have ventured to make this explanation because it seems to me essential that the public should not run away with the idea that *because geologists occasionally disagree on points of theory, that there exists among them any divergence of opinion as to the great foundation stones on which their science has been reared.*"

In the refutation of an argument we frequently meet with examples of this fallacy: the objector shows that his opponent is mistaken upon one point, and thence concludes that the whole of his reasoning is unsound even though it may in nowise depend upon the erroneous statement. "Hence the danger of ever advancing more than can be well maintained, since the refutation of *that* will often quash the whole. . . . . Thus, also, a guilty person may often escape by having too much laid to his charge; so he may also, by having too much evidence against him, *i.e.*, some that is not in itself satisfactory. Accordingly, a prisoner may sometimes obtain acquittal by showing that one of the witnesses against him is an infamous informer and spy; though, perhaps, if that part of the evidence had been omitted, the rest would have been sufficient for conviction."*

* Whately's "Logic," book iii. § 18.

There may often be a combination of the *ignoratio elenchi* with other kinds of fallacies. Thus, instead of proving the *impossibility* of space being finite, philosophers are accustomed to prove its *inconceivability;* and the same thing occurs with regard to any limit of duration: both of these errors arising from the *à priori* belief that the conclusion proved, and the conclusion required, were in each case of equivalent import. So, too, if a supposed cause can be shown as sufficient to produce a certain effect, its existence is inferred, when the real question is, have we any grounds to warrant the supposition itself. Until, for example, Torricelli had succeeded in producing the vacuum to which his name is given, men of science were all agreed upon the statement that "Nature abhors a vacuum," a supposition which was sufficient to account for the difficulty they experienced in making a void space. The illustrious Newton himself adopted the opinion that an interstellar ether existed, not on account of those facts which have led modern philosophers to the same belief, such as the variation observable in the course of comets, and similar reasons; but because he conceived that the effects of gravity might be explained by such an assumption. In the same manner he was obliged to suppose various arbitrary properties of different kinds of matter, in order that his preconceived theory of light should be accordant with the respective phenomena of colour; but yet it must not be imagined that hypotheses are not often of very great service in scientific investigations; for when cautiously applied, and only admitted as provisional, until a more extended knowledge is attained, they form a most valuable instrument of reflection and observation. That such is the case will be at once apparent upon a mere mention of the atomic theory, which found chemistry a scattered, disjointed collection of isolated facts, and gathering the members into one organic whole, left it endowed with vitality, self-impulsive, and possessed of unfathomable power.

The fallacy of "shifting ground" should properly be ranked under this head, and occurs whenever a fresh point is raised before the former one is decided. This is also called "beating about the bush;" it chiefly happens in conversational argu-

ments, and some very good examples may be found in the "Dialogues" of Plato. For instance, in the following passage from the "Gorgias" an *ignoratio elenchi* is finely exposed by Socrates; the question being what name should be applied to Gorgias, the famous orator of Leontium :—

Chæ. But now, since he is skilled in a certain art, what can we properly call him?

Pol. Chærephon, there are many arts among men by experience experimentally discovered; for experience causes our life to proceed according to art, but inexperience according to chance. Of each of these, different persons partake of different arts in different manners; but the best of the best; in the number of whom is Gorgias here, who possesses the finest of the arts.

Soc. Polus appears, Gorgias, to be very well prepared for speaking; but he does not do what he promised Chærephon.

Gor. How so, Socrates?

Soc. He does not appear to me to answer the question that was asked.

Gor. Do you, then, if you please, ask him.

Soc. No, but if yourself would be willing to answer me, I would much rather ask you. For it is evident to me that Polus, from what he has said, has studied more what is called rhetoric than conversation.

Gor. Why so, Socrates?

Soc. Because, Polus, when Chærephon asked you in what art Gorgias was skilled, you praised his art as if some one had blamed it, but you did not say what the art itself is.

In all these cases the only plan of arriving at a satisfactory result is to come to a distinct understanding with regard to the question under debate: and if every proposition admitted or proved be closely compared with the conclusion required, it will be found that very little danger exists of sophistry proving successful.

§ 7. *Conclusion.*

Here, then, terminates our investigation of the several fallacies which most frequently occur; and by a careful study of their various natures, together with the import of the rules laid down for their treatment, we shall find ourselves in a great measure secure against the common forms of error at least; but it will easily be understood that much depends

upon the extent of individual ability, for however perfect an instrument may be, it yet requires a directing intelligence in order to perform its work, and the more ably it is guided the better it will act. Logic can offer no *panacea* against the spread of deception.

The preceding analysis has then enabled us, as far as rules go, to discover whether a given argument be fallacious or the reverse. Accordingly, we are now in a position to understand what true reasoning is, since we know what it is *not;* and we may proceed with some certainty to the consideration of the various processes which are employed in the discovery of truth. In speaking of these processes, I of course allude to those operations which form the especial province of Logic, for although the formal laws of thought must be obeyed in every possible case of observation and reflection, yet there are certain actions of the mind in which they are more particularly concerned. These will form the subject of our next chapter.

CHAPTER VI.

OF LOGIC AS PRACTICALLY APPLIED.

§ 1. *Introductory Remarks.*

THE object of all science is the acquisition of truth, a subject which has as yet occupied but little of our attention; indeed, it would have been impossible to have arrived at any accurate results respecting the *laws* of thinking, if we had not abstracted from these the matter upon which they operate. Now, however, that we have obtained, as I trust, clear and accurate notions of the *mode* in which the natural constitution of our minds influences the operation of all thought, we shall be quite prepared to investigate the *results* of such influence, and to ascertain its practical effects. To do this successfully we must continually bear in mind the various principles which have been enounced during our survey of formal Logic: these relate to the three processes of apprehension, judgment, and inference, teaching us—first, that our objects of thought must be either the ideas of individuals or of classes; secondly, that any assertion concerning these ideas must take the form of a quantitative comparison; and, thirdly, that no reasoning is correct which does not conform to the syllogistic rules, which are proximate applications of the inherent mental canon. But the most transcendent product of our researches has been the firm establishment of the fact that the greatest instrument by which the mind works is *system;* it invariably strives to *arrange* the facts which it gathers, and to erect them into some connected structure; the peculiar office of Logic as a science being to secure the symmetrical adjustment of parts which compose the fabric. This truth, I make bold to say, is the indispensable key to a proper understand-

ing of the nature and working of the reflective faculties; it may be seen to underlie each separate step of our inquiries hitherto; and no explanation of the mysteries involved in the mind's search after truth can be complete unless it enters as an essential element.

Thus much premised, it will readily be imagined that unless our researches conform *strictly* to the natural laws of the intellect, we can only arrive at confusion and contradiction, instead of at truth; for, although we must always in some degree be regulated by the inherent forms of thinking, yet in many cases a considerable deviation takes place, in consequence of an imperfect acquaintance with, and analysis of the principles which should be universally prevalent. This it is which occasions the necessity for an *applied* Logic; that is to say, a science which shall point out the proper method of interweaving the laws developed by formal Logic, with the web of facts that constantly come under our notice, in such a manner that we may attain to the most perfect and correct knowledge of them. And hence it will be apparent that in so doing these laws will require various modifications, in order that they may be accommodated to the respective circumstances of the case; for it must not be forgotten that in treating upon the formal aspect of thought no account was taken of the phases into which reflection would fall when concerned with the *truth* and *falsity* of propositions. So, too, with the mathematical sciences; the principles involved are analysed upon a partial consideration only of the facts to which they are ultimately applied. In geometry, for instance, points are regarded as possessing no magnitude, lines as without breadth, circles as perfectly uniform; although for any practical purposes we must always make allowance for the many departures from theoretical supposition, which must invariably occur. And, paradoxical as it may seem, it is this very disregard of actual truth which confers upon mathematics and Logic the rigid exactness attending all their investigations; the reason being, that by removing all disturbing influences, the attention is concentrated upon such points alone as are of vital importance to the laws which regulate the existence of the science.

Accordingly, we shall find that there is not that precise distinction between the several branches of applied Logic which we found to exist in the subjects about which formal Logic is conversant. The operations run, as it were, hand in hand, presenting such an appearance of simultaneity, that it is often a matter of considerable difficulty to ascertain the exact nature of their mutual dependence and relation. They may, however, be grouped under two heads, Observation and Reflection; the first of these being amenable to the laws of conception and judgment; the second, to those of inference; while connecting them is the motive power of classification, concerning which I have so often spoken. At the same time, it will be impossible, within the present limits, to do more than indicate the best method of studying the vast subject of applied Logic; which, comprehending as it does, the generic features of all the sciences existent and to come, has required the combined efforts of the world's greatest philosophers to attain its present development; and which gives such promise of future progress as to warrant our most sanguine anticipations of results which shall excel by far all that has hitherto been accomplished.

§ 2. *Observation.*

The process of observation naturally presents itself before us as having the prior claim upon our attention; for it is evident that it must always precede reflection, as without objects to think about there would be no thought. And here it behoves us to determine more explicitly than heretofore the import which attaches to the phrase "objects of thought;" as otherwise some ambiguity of expression would be likely to occur in consequence of the idea generally attached to the word "object." This, in ordinary parlance, is held to imply some substance or existence which produces an impression upon our minds, but, when used philosophically, may also signify the impression itself. If, for instance, I say, "Heat is a most mysterious thing," I may either mean the *sensation* of heat, or the *cause* of that sensation; and it is with words of this description that confusion commonly arises. Thus, in Mr. Mill's elaborate and masterly "System of Logic," from

which I have often had occasion to quote, there is the following passage: "But from these and similar generalisations countenance and currency have been given to attempts to resolve, not motion into motion, but heat into motion, light into motion, sensation itself into motion;" where "heat" and "light" would appear to mean the outward *causes* of the respective sensations, and not the *sensations* themselves; for otherwise there needs to be no distinction drawn between "heat," "light," and "*sensation;* but yet, a few lines further on, we read, "All I insist upon . . . is, that it shall not be supposed that by proving these things [*i.e.*, "that certain motions in the particles of bodies are among the *conditions* of the production of heat or light"] one step would be made towards a real explanation of heat, light, or sensation. . . . Let it be shown, for instance, that the most complex series of physical causes and effects succeed one another in the eye and in the brain to produce a sensation of colour; . . . still, at the end of these motions, there is something which is not motion, there is a feeling or sensation of colour." Here, indisputably, Mr. Mill is combating the supposition that the *sensation* of heat, light, &c., is motion, a proceeding, however, altogether irrelevant to the question in hand (as at first stated), viz., whether motion is the *cause* (or "among the *conditions*") of such sensations. An example of this nature is the more instructive, as it will be easily supposed that when so acute and profound a philosopher is led into a confusion of *expression* (for one cannot imagine that there is any confusion of *thought*) by the ambiguity above-mentioned, multitudes of inferior writers will continually mistake the point to be proved, and will involve their arguments accordingly.

Now the word "phenomena" would appear to be better adapted than any other for expressing the notion intended to be conveyed by the phrase "objects of thought;" it being seldom used but in a strictly philosophical sense. We shall, therefore, in the first place, ascertain the nature of those phenomena concerning which our thoughts are occupied, having in view the determination between such as are, and such as are not, the subjects of direct observation.

Every phenomenon is either subjective or objective; either

a condition or state of our mind, or a condition of something apart from our mind. Any knowledge that we may possess of the former must obviously be the result of intuition or immediate perception; but as regards the latter, the operation is by no means so simple, even in the most familiar and, apparently, incomplex cases. Thus, when I touch a piece of iron and say, "This iron is hot," the train of thought from which the judgment results is of the following character:—I look in a certain direction, and am immediately impressed with those sensations of sight, which, from prior experience, I have concluded to be always produced by a series of phenomena termed "iron." I extend my hand in the same direction, and receive two sets of sensations, one consisting of "hardness," &c., thus corroborating the evidence of my eyes as to the existence of "iron," and the other reminding me of sensations similar to those antecedently produced by cases of "heat." I, therefore, feel certain that a series of phenomena exists before me, which resembles a large class of other series in its capacity of raising up a particular sensation, known by the name of "heat;" a conviction which I express by saying, "This iron is hot." Here, then, a process which would be commonly called an act of observation, is seen to consist of two steps: first, the perception of certain sensations, and secondly, an inference based upon the existence of these sensations; consequently, the truth of the statement must depend upon the correctness of the reasoning. Nor is this analysis by any means unimportant, for it frequently happens that a supposed, but non-existent, fact is taken for granted, merely because it has been *observed;* whereas the truth is that it was *inferred.* There is, for example, a beautiful experiment in optics, where a revolving wheel is rendered visible by means of flashes of light, so adjusted that the wheel is once illuminated during each revolution; the effect of this being that although the wheel revolves at the rate of several hundred times a minute, it yet appears to be standing perfectly still; and so perfect is the illusion, that even to imagine it as such is almost impossible. The explanation of this is, that the means employed in the experiment produce sensations which are indistinguishable from those produced by a wheel standing perfectly still,

and this latter phenomenon we accordingly infer to be the case; an instance of fallacious *à priori* reasoning, where the supposition that an effect has but one cause is unduly assumed.

Accordingly, we find that the only phenomena which can be the subject of direct observation, and concerning which we may arrive at *truth* by means of direct observation, are subjective; that is to say, the *existence of certain sensations* is the only thing of which we can be sure when the observing faculties are alone employed. At the same time, it would serve no useful end if we were to push this doctrine to its extreme limits, and more especially in a treatise like the present, which cannot enter very minutely into the ultimate processes of thought; suffice it, therefore, to have called the attention of the student to a point so interesting and essential, as by so doing it may be reasonably hoped that he will have been put sufficiently on his guard to prevent any chance of error arising from this cause. In future, then, I shall not care to be rigidly precise when making use of expressions which involve the process of observation; but I shall still hope to be philosophically exact, for, as we formerly saw when treating upon the parallel case of the so-called immediate reasoning compared with syllogistic inference, a preliminary examination and subsequent neglect of some mental operations is by no means incompatible with a correct exposition of logical science.

Assuming, then, that a comparatively loose sense may be attached to the notion of observation, we have next to inquire into the nature of the process as logically required for the purposes of science; and, as science is merely concerned with the acquirement of truth, it follows that the end of logical observation should be the formation of correct conceptions with reference to those phenomena which are the objects of thought.

Now, the first requisite is that our notions should be *clear;* that is to say, that they should be determinedly fixed; and as the method of arriving at general conceptions, or, in other words, the process of abstraction, has already been described as regards its formal aspect, it now remains to introduce the element of material truth. The main feature of the process consists in comparing together a number of individual objects

with a view to ascertain their points of resemblance, and then conceiving a class composed of any number of objects which might happen to possess those points; and this duplicate operation can only be correctly performed by attending to the following considerations. Let us endeavour, for example, to trace the formation of the conception "metals." We meet with certain individual objects, say gold, silver, and tin, and we wish to obtain such a general notion as may enable us to remember the sensations produced equally by each one of them, and by no other thing. We accordingly analyse the complex impression of each individual, *i.e.*, we concentrate our attention successively upon each separate one of the sensations, and note those which were produced indifferently by gold, silver, or tin. Extending our language a little, we may describe ourselves when so doing as observing the attributes which were possessed in common by the three objects, gold, silver, and tin. Suppose us, therefore, to remark that they all possess weight and hardness; we might here pause and give the name of "metal" to the combination of those two attributes, but were we to do so, we should find that such an idea was not complex enough to distinguish gold, silver, and tin from many other objects, such as stone, wood, &c.; that is to say, we should not have formed a *clear* and *distinct* idea of a metal. We, consequently, resort to observation again and again, until we have abstracted such a combination of attributes, that gold, silver, and tin are the only objects which we know to possess it; we can then *clearly* recall the sensations produced by a "metal." This capability, however, would only belong to ourselves, who had performed the above process; and were we to employ the name in communicating with other persons, it would be necessary for us, in the first place, to define exactly what we mean by the term, as otherwise they might attach a different signification to it, and might include the notions of things totally different from gold, silver, and tin. Here, then, we have two sources of obscurity, imperfect abstraction, and imperfect definition; the remedy for the former being renewed observation; for the latter, those rules which were laid down when treating upon definition in the second chapter of this work.

The second requisite for correct conception is that our notions should be *appropriate;* that is to say, that they should have a proper relation to the question in hand. There can, of course, be no general rule laid down as to what this relation must be in every case, for that can only be settled by the specific end which we propose to ourselves; but yet it may be remarked that the attributes observed should all have some distinct reference to the principle of division adopted in the particular science under investigation. Thus, in the example chosen above, our notion of "metal" would include such marks as hardness, weight, ductility, and malleability, if we were occupied with mechanical researches; to these would be added the capability of forming a base by union with oxygen, if chemistry were our object; while the study of physics would necessitate the inclusion of "great conductive powers" among the metallic attributes.

If, therefore, we take care that our conceptions are clear and appropriate, ascertaining at the same time that our senses do not deceive us as to the real existence of the properties observed, we shall so far be in the possession of truth, and our consequent reflections will rest upon a sound basis. This is all that can be done by observation, and as the nature, conditions, and end of this process have now been described, it would appear that nothing further remains to be added: before, however, I quit this portion of my subject, it may be advisable to offer a few remarks upon the *mode* of observing.

We have already seen that, strictly speaking, subjective facts only can be *directly* observed; but that no inaccuracy need result if we admit the application of the process to certain objective phenomena. It is these latter which will now be considered. And, first, we must note that observation may be direct or indirect; that is to say, we may either employ our unaided senses, or we may make use of instruments to assist us. In the former case, the chief truths at which we arrive are those of quality; in the latter, of quantity. Thus, by making use of the eye alone, we can form an approximate notion as regards the height of an object, and this will be nearer to the truth according as our practical experience is greater; but to know it exactly, we must employ some

measure. Here, in one case, we could merely be sure that the object possessed *some* height; in the other, we could tell the exact *amount*. Or again, a ray of light appears to ordinary observation as perfectly homogeneous and white; Saturn, too, is a mere luminous point; but the application of a prism reveals the existence of various colours in the sunbeam, while a telescope discloses the vision of a far-off world encircled with a glittering belt; and with the perfection of the instrument advances, *pari passu*, our powers of observation. In the solar spectrum, for instance, Fraunhofer was just able to ascertain the duplex nature of the line D, but, recently, Mr. Gassiot, with his magnificent spectroscope, has resolved it into at least sixteen distinctly defined lines. And the same thing took place with regard to Saturn; the employment of a higher telescopic power showed that what at first seemed to be but one belt, was in reality two. It will thus be seen that when the capability of *exact* admeasurement by means of instruments is asserted, all that can be strictly understood is our power of fixing definite limits in one direction at least; and hence we gather that the best method of forming correct conceptions is by observing as precisely as possible, both the *nature* and *amount* of the properties wherein bodies resemble or differ from each other. We must, however, bear in mind the fact that although two attributes differ very much in quantity, yet, if they are alike in *quality*, they will produce exactly the same *kind* of sensation, although varying in degree; consequently, we must place them together in the same class. In our example of "metals," gold, silver, and tin all possess the mark of "weight," but in very different quantities, this difference being one of their distinguishing characters as individuals; and, therefore, if we were to meet with some other object, such as lead, and were to recognise in it the existence of the same kind of attributes as those which we abstracted from gold, silver, and tin, to constitute the notion of a metal, we should at once refer it to that class, although each mark might present a totally different appearance as regarded its amount.

Experiment may also be considered as an act of observation; for although usually the result of reflection, yet in itself

it differs not from the ascertainment of attributes or properties by means of an instrument. In the present place, therefore, we shall merely consider it from the latter point of view, and shall defer all inquiry into the motives for its performance until we come to treat upon the processes of which it is a necessary accompaniment. A *clear* notion then can only be obtained from experiment, by closely observing the nature and amount of the difference between the respective state of things before the commencement, and after the termination of the act; while as to what is an *appropriate* notion, must be wholly determined by the particular object for which we performed the experiment. Thus, if I wished to ascertain the mechanical effects of heat upon red glass, I should notice that the latter became *plastic* when very hot; but were I investigating its optical properties, I should confine my attention to the fact that its *colour* had changed from red to green.

And here it may be remarked that Logic can no more make men good observers than she can make them good reasoners, except in so far as the adherence to rules laid down in strict accordance with mental laws will tend to a healthy exercise and invigorating discipline of the intellect. It is a just saying that "practice makes perfect," but all the watering and attendance possible will never produce an oak from a thistle-seed; and so the most that can be done is to cultivate to the best advantage whatever has been originally implanted. Accordingly, the end of observation—*i.e.*, the attainment of correct notions—will be greatly promoted by the *habitual* exercise of the faculty in accordance with the suggestions given above; but it is necessary that a good observer should also possess a retentive memory and wide experience, as otherwise his ideas would soon become confused, or they would not accord so closely with actual truth as to be of much avail for practical purposes.

§ 3. *Reflection.*

1°. *Of Laws and Causes.* As yet our attention has been confined to the ascertainment of what amount of truth may be acquired by the employment of observation alone. We

have found that even when the widest latitude is allowed, the results so obtained are merely a collection of separate ideas, these ideas being composed of various resemblances and differences. But, numerous as such notions may be, they constitute a very small portion indeed of existent truth. We have certainly coasted along the shore, and surveyed its general features; the vast interior, however, still remains unexplored. That is to say, having collected the facts, we must now examine into their connection, and in so doing we shall perceive that the laws of inference are alone adequate to the task: therefore, without a previous knowledge of them, our labours would but terminate in confusion and disappointment.

The bare *existence* of phenomena has hitherto been the subject of our analysis; we must now endeavour to justly appreciate the *modes* in which they exist; and as the order of time is here alluded to, it will at once be seen that a list of these modes may be easily made; in fact, there are but two—*coexistence* and *sequence*, for phenomena must either occur together, or in succession. Which order obtains in any particular case is, of course, determined by observation; the right understanding of such order is the office of reflection.

Now, in our sphere of thought, we cannot but observe that a certain principle of *uniformity* prevails, more or less, in every occurrence which comes under our notice. Thus, a heavy body if unsupported falls to the ground; a pressure, when not sufficiently opposed, is followed by motion in the object pressed; death invariably succeeds the infliction of certain wounds; the explosion of gunpowder is always accompanied by the extrication of heat and light. All these facts must impress themselves strongly upon our attention. But in other cases the uniformity is by no means so general; it is only some men, for instance, who have black hair; it is only occasionally that we meet with natural springs whose waters are more highly heated than the surrounding earth; it is not always that a west wind is accompanied by rain. These considerations lead us to a distinction between uniformities, which we accordingly regard as necessary, or casual; as invariably occurring, or happening, as it were, by chance. The grounds upon which this distinction may be correctly

made will shortly be explained; at present we are concerned simply with the fact as it stands.

The impression produced upon our minds by the regularity with which many phenomena recur is that nature works according to some uniform necessity, this being termed a *law;* and, consequently, we speak of certain uniformities as being *laws of nature.* Thus, we say that for matter to possess weight as one of its attributes is a natural law; that the orderly constitution of nature renders it necessary for water to tend to find its level; that motion unopposed must continue for ever. It is, however, only to truths of this ultimate description that the term "laws of nature" is applied; many uniformities which at first sight might appear of the same description, being in reality *results* of the former. Thus, that the moon should revolve about the earth as a centre, would, from the perfect uniformity of the revolution, seem to be a natural law; but closer investigation shows that the motion takes place in obedience to three separate laws applied under certain circumstances. In fact, we might predict *à priori* such an effect as resulting from given conditions, but we could not predict the conditions themselves antecedently to experience.

And this leads us to a cognate consideration of great importance; the determination of what is implied by the expression "resulting." Here, of course, the cases are limited to uniformities of sequence—that is to say, those phenomena which we always observe to occur in regular succession. The names usually applied to any duplicate set of this description are *cause* and *effect;* reference being made to a law of nature, which must now be explained, viz., the law of universal causation. Some idea of the mode in which we arrive at this law may be thus given: we observe throughout nature that whenever anything occurs there have always existed some antecedent conditions; and we also observe that certain conditions are invariably followed by definite consequents. If I feel unwell I know that some abnormal state of my body has previously supervened; if I thrust my hand into the fire I know that sharp pain will immediately succeed; when rain falls we feel certain that the suspension of water in the air

preceded the storm; or, should we pass a strong current of electricity through a piece of thin platinum wire, we are assured that the latter will speedily become red-hot. Experience of this nature leads us to the conclusion that if anything have a beginning it has also a *cause;* that is to say, some condition, or group of conditions, must have previously existed, in virtue of which existence the phenomenon in question was produced.

But we must not suppose that *all* uniformities of sequence, how universal soever they may be, are cases in which the law of causation operates; for it will have been observed that the name of *cause* is only applied to those conditions *in virtue of whose existence* the effect *necessarily* follows—to those phenomena without which other phenomena would not occur, but which being once posited the other *must* spring into being. Therefore, when the sequence is merely casual, and there is no connection of necessity between the events, we cannot refer them to the law of causation: for example, when summer invariably follows spring; autumn, summer; and winter, autumn; it could not be said that one season was the *cause* of the next, for then the two requisites of cause and effect would be violated; it being possible for a perpetual summer to exist, or for winter to immediately succeed summer without the intervention of autumn, in consequence of some change taking place in the earth's position with regard to the sun, or in the present physical configuration of the earth.

Nor must any mere arbitrary limit be placed upon the signification of "cause;" we must not make a selection from the conditions upon which an event depends. It is true that this is almost invariably done, as when the prick of a needle is said to be the *cause* of the pain which I feel; or when iron is said to be dissolved *because* sulphuric acid is poured on it; or, again, when the metamorphism of certain rocks is said to be produced by the action of fire. In all these cases there is an omission of necessary particulars. Thus, in the first I should not feel pain from the prick unless I were alive, and possessed a certain organisation, &c.; in the second, the iron would not be dissolved if, in addition to the mere presence of the acid, there did not exist a certain attraction between

oxygen and iron, oxide of iron and sulphuric acid; while in the third, some physical properties of matter, such as polarity, &c., are equally essential with heat to the production of the effect. Also, in every case there must necessarily exist a negative condition, besides those which are positive; this being the absence of counteracting causes, that is, those conditions which tend to produce a contrary effect. Thus, in the present state of the solar system, the earth keeps at a certain distance from the sun; but were the latter body and his attendant planets in their common motion through space to enter some resisting medium, the earth, although acted upon by all its former influences, would yet fall into the sun by reason of the new condition preventing the old causes from producing their wonted effects.

Accordingly, the vulgar sense of the word *cause* does not express its philosophical import; and this ambiguity it will be necessary to bear in mind, as, from the convenience attaching to limited notions, it is often expedient for the attainment of the purpose in hand to consider *that* the cause, which really is but a portion of the conditions requisite for the production of the effect. For instance, when heat is said to cause the expansion of a bar of iron, we mean that heat is the condition whose introduction amongst other conditions gives rise to the change in volume; or, in the example given above, the resisting medium would be said to cause the earth's fall into the sun, not because it could produce such an effect when acting alone, but on account of its enabling gravitation to act under less opposition from centrifugal force.

It will now be seen that a *law of nature* is nothing more nor less than the expression of the relation existing between any single cause and its effect. By applying this doctrine to the truths first cited as natural laws, we may obtain a clear notion of its application. That matter possesses weight, then, means that wherever the entity termed matter exists it will possess the attribute of weight; but it may be said that matter would not be matter without possessing weight, and that, therefore, weight would be simultaneous in its existence with matter. This, of course, opens up the question as to all cases of cause and effect, for who can say that the conse-

quent does not commence to exist at the selfsame moment that its conditioning antecedents are complete; so that the argument, if valid, would show that there is no such thing as sequence in any case of causation. Now I am very far from denying the cogency of such reasoning, but this I do say, that for all practical purposes we may safely admit the notion of succession. As, therefore, "weight" is but the attraction subsisting between material bodies, we may assume that were some new matter to be created it would have no weight *until* it attracted, and had been attracted by other matter; this operation taking place by virtue of a natural law that renders its occurrence a matter of necessity. And so with the second and third laws; whenever a gravitating fluid exists there results an equal pressure in all directions, this fact being expressed by the statement that water tends to find its own level; or, lastly, whenever motion exists alone, it continues for ever. In all these cases the antecedents are the causes, the consequents are the effects, and the necessary connections between the respective pairs of phenomena are the laws.

2°. *Of Induction.* When speaking of observation, I had occasion to remark, that the existence of objective facts was a matter of inference based upon our "experience" of subjective phenomena; and again, in the preceding division, we found that the distinction between necessary and casual uniformities, was also originated by the accumulations of observation, *i.e.*, by "experience." What is the meaning of this phrase must now, therefore, be discussed.

We have just synonymised "experience" by the expression "accumulation of observations;" but when we say that a certain proposition is warranted by experience, we do not mean that our inference rests upon the whole mass of observations which we have ever made, but that a consideration of such observations as relate to the fact in question, has disposed us to infer, as a general truth, the uniformity which constitutes the judgment. That is to say, by reflecting upon certain separate observations, we are induced to believe in the existence of some law. The operation of the mind by which this result is produced, has been named Induction, and may be defined as the process of assigning causes for effects.

Now, as it is by induction that we arrive at laws and causes, which, as shown above, constitute by far the major portion of existent truth, it follows that in an exposition of applied Logic this operation of the mind must occupy the most important position. And, accordingly, it will be advisable to treat as fully as our limits of space will allow, upon the nature and method of correct induction; or, in other words, upon the mental laws which impel us to generalise from experience, and upon the quantity and quality of that experience, which these laws render necessary for the establishment of a correct inference.

Let us, then, in the first place, retrace the steps by which we have arrived at any proposition, and endeavour to ascertain upon what fundamental ground they all rest. Suppose we take this judgment, "The earth is a globe;" the question then comes, what are the premises from which such a conclusion was derived? These we know to be "every body which in certain positions would cast such and such a shadow upon the moon, and which could be circumnavigated, &c., is a globe" (U) for the major, and "the earth possesses these attributes" for a minor; and as the latter is the direct product of observation (loosely), it remains to be considered how the former was obtained—that is to say, we must next examine our grounds for stating that *all* globes possess the properties in question. This judgment cannot, of course, be the direct product of observation, for even had we been able to examine every globe at present existing, the proposition directly resulting would not be equivalent to the one above stated, which, being universal, must apply to all globes which have ever existed, or will exist henceforth, in addition to those of present entity. It must, consequently, depend upon reflection, *i.e.*, upon a process of reasoning from observed facts; and as we have seen in formal Logic, that all reasoning whatever may be reduced to syllogisms, it results that the judgment, "all globes possess such and such properties," is a conclusion drawn from previously established premises. Of these Observation gives one, viz., "This, that, and the other globe, have been found to possess the attributes above mentioned;" and, therefore, since the syllogism is valid, the other

must be to this effect, "Whatever may be predicated of this, that, and the other globe, may be predicated of *all* globes;" which means, "Whatever attributes are found to accompany this, that, and the other globe, will be found to equally accompany every other globe." Pursuing a similar course, we next arrive at the following syllogism:—

A case of a certain particular uniformity is a case of the corresponding general uniformity,

The case of this, that, and the other globe being found to possess the attributes in question, is such a case of particular uniformity;

∴ The case of this, that, and the other globe being found to possess certain attributes, is a case of *all* globes being similarly marked.

Now beyond this we cannot go; that is to say, we cannot assign any premises which would necessitate as a conclusion the last-mentioned major-premiss. Accordingly, for all purposes of Logic, we must assume the principle thus stated to be a fundamental law of the mind, by which, from ascertaining one truth, we are compelled to believe another. Its enunciation in the above syllogism is manifestly of a very partial character, as a due comprehension of its import would necessitate a complete explication of the phrase, "a *certain* particular uniformity;" but this is the province of inductive *method*, and is foreign to our immediate purpose, viz., the treatment of inductive *elements*. To firmly establish these, we must next show that the law at which we have just arrived, is really of the nature claimed for it, *i.e.*, fundamental. At the same time, it will not be necessary to proceed any further with an investigation of the mind's ultimate constitution, as to do this would be to intrench upon the domain of metaphysics. But we must rather endeavour to show, that all other principles of reasoning, or axioms, are merely differentiations of the foregoing law. And as so wide a subject could not be entirely discussed in our limited space, it will be sufficient if we confine our attention to the axiomatic "law of causation," and to any one of the mathematical principles; say, "if equals be added to equals, the wholes are equal."

We have already taken occasion to remark that the first of

these axioms is the result of experience,—that it is our observation of *some* cases of antecedence which induces us to believe that *all* events are the effects of causes. But unless there existed some necessary mental law to legitimatize this inference, we should obviously be unable to rely upon its correctness, as then the only conclusion that could possibly be trustworthy, would be that resulting from an inductive syllogism of the kind mentioned in Formal Logic; in other words, we should be unable to proceed beyond the limits of our actual experience. Consequently, our observations of various instances of cause and effect require the aid of the inductive law before we can deduce any such general statement as that under consideration, and which is often termed "the assertion of nature's uniformity."

The second axiom, although usually considered fundamental, is, strictly speaking, of more complex derivation than the law of causation; for the latter is but one step removed from the inductive principle, while the former is separated by two syllogisms. These may be thus expressed:—

1°. Certain particular uniformities legitimatize the inference of the corresponding general uniformities,
Some cases of equal magnitudes being the same number of coincident magnitudes, constitute the required particular uniformity;
∴ It is true that "all equal magnitudes are all coincident magnitudes."

2°. All equal magnitudes are coincident (U),
All sums of equals are coincident;
∴ All sums of equals are equal.

I have stated the second argument as a simple syllogism, although it would be possible to show that it is of an epicheirematic nature, the minor premiss being a conclusion based upon the major. But this matters not in the present place, where we are only concerned with proving that the canon, "if equals be added to equals, the wholes are equal;" or, as otherwise expressed, "the sums of equals are equal," is dependent for its adoption upon the inductive law, and has *per se* no *locus standi*. An inspection of the above reasoning will show that we have effected our purpose, and that the

fundamental grounds of the mathematical axioms are observation conjoined with reflection; the knowledge acquired by experience being developed and increased by the laws which regulate our minds.*

It will be remembered that when treating upon syllogistic inference, we found the fundamental law of that process to be *directly* inapplicable to many forms of reasoning, insomuch that for practical purposes it was developed into a series of proximate rules, which were sufficient to test the validity of all arguments, without our being at the trouble of effecting a reduction to syllogisms of the first figure. The same thing occurs in Applied Logic. We must differentiate the law of induction to such an extent, that the proximate canons thus obtained may enable us to judge correctly as to the truth of the propositions at which we arrive, and may render any reference to original principles unnecessary. But since such a differentiation can only be accomplished by completely appreciating the meaning of the inductive law; it follows that the doctrine of inductive *method* will next claim our attention.

Now, the truths at which we arrive by means of induction, are of two kinds: either the statement of general laws, *i.e.*, an assertion of natural uniformities, without any exact discrimination of cause and effect, such as mathematical axioms, &c.; or the knowledge of special laws, which consists in the assignment of definite causes for definite effects, and *vice versâ*, as, for instance, the truths of astronomy or chemistry. And, first, we will inquire as to what kind of experience warrants us in concluding the latter class of truths.

The cause of any effect is, as already stated, the whole of the conditions which unite in producing it; but this definition being too wide for my present purpose, I shall in the following remarks understand by a *cause* "that circumstance which produces some definite change in a set of antecedent conditions:" thus, a bell while sounding remains in exactly the same state as when it was silent, with the exception that its particles are vibrating: this vibration, then, is termed the

* Some additional exposition of this subject will be found in Appendix D.

cause of the sound. So much being premised, I shall now investigate the mode in which we may determine the cause of any phenomenon.

It will of course be evident, that the cause must exist amongst the conditions which compose the phenomenon in its totality; for otherwise, there would not be that connection of necessity which we have seen is essential in every case of a sequence obeying a law. If, therefore, we have two or more instances of the effect which differ from each other in some things, but all agree in certain conditions, these latter are the only things which exist in every instance of the effect, and, accordingly, in them the cause must be sought. We thus obtain the canon of Agreement, which runs as follows:—

1°. The cause will be found among the circumstances in which two or more instances of the effect agree.

Or,

A uniformity which is observed in two or more instances, may be considered as invariable and necessary.

If, for example, we found that gold and silver both conducted heat, we might say that the cause of such a power was included in the possession of metallic attributes, since that would be the sole circumstance in which the instances agreed; or, in accordance with the above variation of the canon, it would be allowable to hold that every metal is capable of conducting heat. We can, however, only infer *absolute* laws, whether the observed effects be relative or absolute; thus, from gold and silver being heavier than water, we cannot conclude that all metals are so, as the phenomenon investigated was not precisely the same in each case, *i.e.*, the two metals differed in the amount by which they were heavier than water. But since they definitely agreed in possessing weight, we may affirm that property of all metals; indeed, it forms one of the purely metallic attributes.

The information acquired by means of the above canon is seldom satisfactory, as we are only able to ascertain the precise cause in those very rare cases where the phenomena agree but in *one* point; so that although truth is acquired, yet it is so vague and indefinite as to be oftentimes prac-

tically worthless. In the example just given, all that we can be sure of is, that the power of conducting heat is in some manner connected with the possession of metallic attributes. If, therefore, we would arrive at a clearer notion of causes, we must seek for some method of singling out the desired conditions from among the set which have been presented to us by the canon of agreement.

Now, as an effect necessarily follows from its cause, except where there is a counteracting cause (which would be a new condition), we may conclude, that when, of two cases, one contains the phenomenon under investigation, and the other does not, the cause is not to be sought among the conditions common to both. If, therefore, we observe a case which does not exhibit the phenomenon, but all of whose conditions are contained in the set pointed out by the canon of agreement, we shall be enabled to eliminate these conditions from the number among which the cause is to be found, and thus our limits of search will be much narrowed. A sufficient repetition of this process will eventually point out with definition and certainty the law which we are endeavouring to discover; and thus it may be seen that in this we possess a method of complete efficacy, in all cases susceptible of its application. The canon which regulates the operation, and which is termed the canon of Difference, may be enunciated in the following manner:—

2°. The cause will be found among the circumstances in which an instance, composed of a portion of the conditions set apart by the canon of agreement, but not containing the effect, differs from an instance which is composed of all such conditions.

The example chosen for exhibiting the method of agreement is not adapted to illustrate that of difference, for we are unable to select any body which is totally destitute of conductive powers as regards heat; we must consequently make use of some other instance, and leave this to be dealt with hereafter. Suppose we wished to discover the conditions upon which our hearing the sound of a bell depends: we should learn by the method of agreement that all bells, however they might differ in shape, size, tone, &c., yet, when sounding,

agreed in vibrating and in being placed in the atmosphere. Next, we should endeavour to obtain an instance of a bell being struck, and thus thrown into vibration, but under different circumstances, which might result in the sound being no longer heard. This would be effected by striking the bell in the exhausted receiver of an air-pump, when we should be unable to hear any sound; and the condition in which the instances differed, *i.e.*, the presence of an atmosphere, would consequently be the cause of sound being audible.

We have just seen, however, that the method of difference is always inapplicable when no instance of the phenomenon's non-occurrence can be obtained; a circumstance which would be a great hindrance towards the acquirement of truth, were we unable to find any remedy. But this is not impossible, for although the canon of difference is much more powerful than that of agreement, yet it is similarly restricted, as, by its means, we can only discover absolute laws, without any reference to quantity. Accordingly, we must now endeavour to obtain some knowledge of the means whereby the latter object may be accomplished.

Among the uniformities of invariable sequence which come within our observation, we cannot fail to remark the existence in most cases of a certain ratio between cause and effect; between antecedent and consequent. Thus, a small dose of arsenic produces no visible effect upon a man's constitution; a larger dose makes him ill; and a still greater quantity kills him; while beyond this limit no extension of its deadly effect can occur. Or, in blasting rocks, the work done is altogether dependent upon the weight of gunpowder used; assuming, of course, that the *modus operandi* remains the same. We are, consequently, led to the conclusion that the effect is always directly proportional to the cause, and that a variation in one is attendant on, or followed by, a corresponding variation in the other. But in one of the examples mentioned above, this law does not appear at first sight to be universally true, for we have said that however large the quantity of arsenic may be, it can do no more than produce death; and this leads us to the consideration that, for practical purposes, apparent limits are often assigned to the law

in question, a cause being still regarded as the same with reference to the effect, although some condition has disappeared. In the case alluded to, it is evident that the complete antecedent of death is composed of the poison capable of acting upon some organism, together with the organism itself in a *state of life;* but it is equally evident that when death has supervened, the conditions existing are such as not to be capable of producing a similar effect, for the object to be destroyed no longer exists. The law is, therefore, seen to be universal, when we adopt the strict signification of "cause" as formerly explained; but at present we may safely assign those limits which are rendered necessary by our immediate apprehension of "invariable sequence."

The canon then of Proportional Variation runs thus:—

3°. Whenever a phenomenon varies proportionately to the variation of some condition, there exists a uniformity of necessary sequence between them.

The employment of this doctrine will enable us to arrive at truths which would otherwise be inaccessible. Take, for instance, the determination of the properties which cause metals to conduct heat. We find that no two possess equal conductive powers, and, also, that no two possess similar molecular constitution; in like manner we ascertain that any variation in the arrangement of the particles in a single metal occasions a corresponding variation of its conductive power; but as our means of observation do not at present enable us to assign any distinct ratio between the variations of each separate mode of constitution, and the induced variations of conductivity, we can only conclude that some uniformity of dependence exists, without attempting to fix its precise law. I have purposely chosen an example of this extreme nature, as by it is shown that the canons of induction will at all times suffice to assure us of the right path to pursue, even in cases where the imperfect state of science precludes our attaining any immediate proximity to ultimate truth.

We have now discussed the three principal canons of induction; there are, however, various practical corollaries and rules which spring from them, and as it would be impossible to consider each of these separately in a treatise like the

present, I think it best to proceed at once to the investigation of the other processes employed in the attainment of truth, and then to give an account of some scientific discoveries which will exhibit in a concrete form the development and application of such doctrines as we have examined.

3°. *Of Deduction, Hypothesis, and Verification.* By *induction* we are enabled to arrive at general truths. When these are employed for the ascertainment of any particular truth not previously established we are said to *deduce.* Thus, induction has taught us that all beings which possess the attributes of humanity are mortal; therefore, when a fresh nation is discovered in Central Africa, we may with certainty predict that they are subject to death. Or, from the laws which have been found to regulate the respective motions of the bodies forming the solar system, astronomers can accurately foretell eclipses and other results of the changes that continually take place in the relative positions of the sun and its attendant planets. These judgments are the product of deduction based upon prior induction, and it is, therefore, commonly maintained that the sole and ultimate foundation for all our knowledge of truth is experience, *i.e.*, our observation of particular facts. This view, however, we have shown to be but partially correct, as the primary operation to which we traced the process of induction, consisted of a deduction from observation referred to a general principle—of a syllogism, in fact, and, as such, amenable to the laws of mediate inference. Formal Logic, therefore, is the ultimate judge of all the mental operations with which thought is concerned; and deduction is the first step made in our search after truth. Consequently, the title of the present division of Reflection must be held to refer to a secondary and derivative process of deduction, employed for the purpose of utilising the laws determined by the original *deductive* operation which, on account of its strongly marked and distinguishing features, has received the name of Induction.

In all scientific inquiries it is seldom found that single causes are in operation; but as the inductive method is better adapted for the ascertainment of individual than of general laws, it usually makes us alone conversant with the relation

subsisting between solitary cases of antecedents and consequents. Here, then, we have the special province of deduction pointed out, viz., the determining of the effects necessarily resulting from a combination of causes. And as this is done by a series of syllogistic reasonings, it will not require analysis in the present place, as we have already considered these at full length in the chapter upon syllogisms. I may, however, remark that the finest examples of the deductive method will be found in the mathematical sciences, such as geometry and algebra, where the vast body of general truths are all derived from a proper union of a few simple laws.

I have said that by induction we usually arrive at individual laws, *i.e.*, at laws which are applicable to single or to few phenomena. By this I would be understood to mean, that the laws thus acquired will, in general, merely suffice to explain the sequence in the cases under direct consideration, or in cases essentially similar, being quite unserviceable when we attempt to extend their sphere. Thus, the phenomena of falling bodies led at first to the inference that it was the *nature* of most terrestrial matter to move downwards; and a consideration of the planetary motions resulted in the conclusion that orbits were circular, because of the perfection supposed to inhere in that species of curve. And even when more correct notions prevailed, laws were for long entertained, which assumed different sequences of causation as existing between celestial and terrestrial motions, it being reserved for Sir Isaac Newton to point out by a process of deduction, that the one law of gravitation was the regulating principle of the solar system, extending its influence from the determination of the cosmical cycles, to the least important of the movements taking place upon the earth's surface.

It is not, however, always possible at the first blush to obtain such laws by induction, as may suffice when developed by the deductive method, for the full appreciation of the phenomena under investigation. In such cases the resort of the philosopher is hypothesis, which, when properly employed, will often suggest those observations that are capable of affording the grounds required by induction; but as regards the formation of hypotheses, all rules are of little avail, for

success must entirely depend upon that natural sagacity, the possession of which is in a great measure the characteristic of genius. At the same time, it is quite possible to indicate the manner in which a hypothesis should be treated, and to point out the purposes it will best serve.

A hypothesis, then, is the supposition of some law which shall serve to explain such sequences as have become the objects of observation. It is, therefore, employed when the cases in question are incapable of the particular collation required by the inductive canons, or their corollaries; that is to say, when the facts cannot of themselves lead to any determined truth; and when once the hypothesis has been framed it should be used deductively; first, with a view to ascertain if the results thence arising correspond with the actual instances observed; and in the next place, to infer the existence of new phenomena, which may then be sought for, and which, if discovered, will render probable the truth of the supposition. This duplicate process is termed verification, but, as just described, cannot be considered complete; the hypothesis being spoken of, as thereby shown to be "probably," not "certainly," true. In many cases, however, an extension of verification may amount to a perfect induction, for if we first prove that the supposed law is of such a nature as to account for the phenomena already observed, and to predict the occurrence of fresh examples; and, then, in addition, show that no other supposition could offer a similar explanation, we shall satisfy the requirements of the canons of agreement and difference, thus establishing the hypothesis as a true law.

It will also be seen that in verification we have a most important adjunct of deduction, for when the latter process has, from the results of induction, arranged a system of laws, we may test the accuracy of these by employing them to explain observed phenomena, and to foretell facts that yet remain to be discovered; and if in this manner we are led to satisfactory conclusions, we shall be enabled to strengthen the primary induction by means of the additional evidence thus obtained. Experiment is perhaps the most common method of verification, and deals exclusively with the prediction of sequences; in fact, every operation of practical life

is an experiment by which we confirm afresh the laws deduced by the various sciences. Our ships and buildings are all constructed in accordance with the principles of mechanics; the art of agriculture is successful proportionately as it conforms to chemical laws; the safety of every sailor depends upon a special application of mathematics; and thus we continually become more and more convinced of our ability to attain truth by means of a strict adherence to those mental laws which it is the office of Logic to discover and explain.

4°. *Of Analogy.* The framing of any hypothesis is never a work of chance, *i.e.*, a mere guess, in the strictest sense of the word, but is usually suggested by some circumstances of the observed phenomenon. Of these circumstances, the only one which it will be necessary to mention here, is analogy, which, it will be borne in mind, has already required our attention, when we were discussing the subject of fallacies. It was then described as the similarity of relations, and arguments both false and true were noticed as being founded thereupon. We must not, however, suppose that complete certainty may be attained by analogical reasoning; as at the best, one can only infer a very strong degree of probability for the law deduced; this being treated hypothetically, *i.e.*, as a *provisional* principle, until fully verified, when it of course assumes the position of an established truth. It will, therefore, be obvious, that the cogency of any argument from analogy must depend altogether upon the special features of the case; and, accordingly, I shall not attempt to give an exposition of the various analogical methods. The student may, however, gain a very good idea of analogy in general, by carefully considering the following *résumé* of a celebrated problem, viz., whether the planets are inhabited.

In the first place, it is requisite that we should be put in possession of a certain number of facts, upon the basis of which we may found our argument. And, for reasons which will shortly appear, these facts should consist of similarities observed to exist between the earth and the other planets. Accordingly, a judicious use of the telescope has enabled us to accumulate the truths which follow. We find that Mercury,

Venus, and Mars, are each provided with an atmosphere; and so distinctly is this visible, that we can clearly perceive the morning and evening twilight on Venus; we find, too, that clouds exist in these atmospheres, thus showing the existence of meteorological phenomena, such as rain, hail, snow, winds, &c., upon the respective planets. Again, it is ascertained that Mercury, Venus, and Mars revolve upon their axes, giving rise to the regular production of night and day, the respective lengths of these differing only by a few minutes from that which obtains upon the earth; and, as the axis of Mars is inclined to the plane of his orbit at an angle very similar to the obliquity of the terrestrial ecliptic, it follows that as far as the sun is concerned, the seasons in both planets do not vary to any great extent, while very good reasons exist for supposing the same thing to occur in Mercury and Venus also. Nor does much variety obtain in the supply of light and heat to the four bodies of which we are speaking, whether reference be made to its uniformity or intensity; and, as regards the effect of gravity, it is found that the weights of bodies upon the surface of Venus are very similar to those upon the earth, and that weights upon Mercury and Mars are about half as heavy. Lastly, the existence of continents and seas has been observed upon Mars; his polar regions being eternally covered with snow, the limits of which extend in winter and contract in summer.

Having thus found that certain similarities exist between the earth and its neighbouring planet, we must, in the next place, ascertain what bearing these conditions have upon the phenomena of life. Nor does this require a lengthened investigation, for it will be immediately apparent, that on the earth all life is exactly adapted to, and depends upon, such physical circumstances as the existence of light, heat, air, water, night, day, the succession of the seasons, the surface configuration of land and sea, &c., &c. Now, in their relation to life such as ours, the physical conditions of Mercury, Venus, and Mars, may be considered as identical with those of the earth, and, accordingly, we form the following syllogism based upon analogy, or, in other words, upon a similarity of relations :—

Terrestrial phenomena are accompanied by life (A),
Terrestrial phenomena are the phenomena of Mercury, Venus, and Mars (U);
∴ The phenomena of Mercury, Venus, and Mars, are accompanied by life (A).

If the premises are here granted, the argument is perfectly true, for A U A is a valid mood, and the proper method of refuting the syllogism would be to show the falsity of the minor premiss, which asserts, that as far as the present argument is concerned, the physical phenomena of Mars, Venus, and Mercury are the same as those of the earth.

With reference to Jupiter, Saturn, Uranus, and Neptune, the argument is of less force, as although they possess atmospheres, alternations of day, night, and the seasons, together with water, &c., yet a consideration of their bulk, and other reflections, show that if life does exist upon them, it must differ considerably from terrestrial being: at the same time, it may be proved that there need be no greater variation between the life upon those planets and that upon the earth, than exists between the inhabitants of our torrid and frigid zones. Accordingly, the analogical relation is much weaker, thus casting greater doubt upon the admissibility of the minor premiss.

5°. *Of Chance and Probability.* In the preceding remarks occasion has been taken to introduce the subject of probability; and as absolute certainty is of very rare occurrence in practice, it would not be advisable to close this notice of the reflective processes, without adding a few words upon the amount of belief which may be attached to certain judgments.

This leads us to consider a certain restriction which attends the application of the canon of agreement. Its enunciation, it will be remembered, is as follows:—"A uniformity which is observed in two or more instances, may be considered as invariable and necessary;" this referring to a law of causation existing between the common antecedent and consequent of the instances in question. Now it is evident that, for anything we can tell to the contrary, it may be necessary for the *whole* of such antecedent to exist before the phenomenon can be produced; and therefore, at the best, we can only generalize

as to cases precisely similar in every respect to the observed instances. The law thus induced is termed an empirical law, and is of no use for the explanation of phenomena. But then again, it may happen that an effect is capable of being produced by a variety of causes; that is to say, that the common conditions of the instances may co-operate successively with the respective points of difference in giving rise to the same effect, assuming, of course, that we know of no connection between the various instances, all of them being equally independent. In such a case the effect would be termed the result of chance, as distinguished from law; this meaning that we see no reason why the common conditions should be joined to any particular antecedent, or why, if so joined, the phenomenon should occur.

It, therefore, becomes a matter of some interest to discover under what circumstances we are entitled to infer a *causal* instead of a *casual* uniformity, when the canon of agreement is alone used, and when, consequently, we are ignorant of any relation subsisting between the instances except such as are by this means discovered. These circumstances are usually determined in the following manner:—

Suppose a series of instances among which we know none of the causes in operation, nor any necessary connection whatever; as for instance, the case of a box containing balls similar in every respect but colour, these being drawn out separately by a person blindfolded. The question comes as to what probability there is for any one colour to be drawn rather than another. Now the supposition being that any one ball is as likely to be drawn as any other, it follows that if there were only two, black and white, the chances would be equal; and so, in like manner, would it be if there were two of each colour, or three, or four, or, in fact, any number. But suppose there were two white to one black, then it is evident that of all the drawings possible, two would be in favour of white, and only one in favour of black, so that the "chances" are two to one against black; and in general it will be found that, as far as mere casualty is concerned, the probability of any event occurring may be measured by the proportion of the number of cases in favour of such event to the total number

possible; thus, in the first of our examples the probability of white was one-half, or one out of two; in the second it was two-thirds, or two out of three.

By similar investigations mathematicians have determined that the chance against any particular casual event *recurring* a given number of times in succession, is as the number of possible events raised to a corresponding power to unity. Thus, four to one are the odds that heads will not be thrown twice in succession when a coin is tossed; nine to one that heads will not occur three times successively, and so on. Also it has been shown that the chance of an event already observed again occurring may be represented by a fraction whose numerator is composed of the instances observed, increased by one, and whose denominator is the same number increased by two; the chance against recurrence being that fraction, which, together with the chance for, would amount to unity. If, for example, I knew nothing of astronomy, and were to observe a comet appear for six successive nights in a certain portion of the sky, I might reasonably conclude that the chances for the phenomenon being again apparent on the next night were as seven-eighths to one-eighth, *i.e.*, as seven to one.

Thus it will be seen that every increase in the number of times of observing the uniformity under similar conditions lends a vast amount of additional weight to the belief that there is some law concerned, and that the phenomenon is not a product of chance; accordingly, it is considered generally requisite that before an empirical law can be laid down as such there must have been a sufficient number of instances observed to have eliminated chance; that is to say, the uniformity must have occurred a greater number of times than can be accounted for by the operation of chance.

The importance of these considerations will be at once evident, when we reflect that the law of causation and all axiomatic principles are the products of the canon of agreement alone, and are, so far, but empirical laws. As, however, their limits of space and time comprehend all that we, as human beings, are concerned with, we may act upon them with a perfect assurance of their certitude.

6°. *Examples of Reflection. a. The Discovery of Neptune.* I shall take for my first concrete illustration of the reflective process that most stupendous achievement of modern astronomy, the discovery of the planet Neptune, which, presenting as it does one of the completest triumphs of the human intellect, is pre-eminently calculated to display the vast accession of power which original sagacity acquires by the proper development of the reasoning faculties.

The process of verification first led to the above-mentioned discovery, and in the following manner. The Newtonian law of gravity, together with the laws of motion, had been found sufficient for the explanation and prediction of planetary movements until, in 1781, Uranus was discovered by Sir W. Herschel. This afforded a fresh test of those laws, and astronomers were not slow in availing themselves of the opportunity; for not only did they compute tables, and construct ephemerides by which the future places of Uranus might be predicted, but they also calculated the positions which it had occupied in past times, and so were enabled to identify it with a supposed fixed star that had previously been observed at various periods by Flamsteed, Bradley, Mayer, and Lemonnier. At the same time, however, it was found that the planet had not occupied the *exact* positions which were deduced from the above-mentioned laws, as its observed places deviated sensibly from the calculated ones; it, therefore, became a matter of importance to ascertain the cause of such deviations; and for this there were two hypotheses open—either the deviations were caused by chance, such as errors of observation, or by the operation of some definite and regular law. Accordingly, it was not until about 1840 that a sufficient number of observations had been accumulated so as to eliminate chance, and then the facts stood as follows. The planet was known to move in obedience to three causes—the laws of motion, the attraction of the sun, and the perturbations induced by the proximity of Jupiter and Saturn; but a deduction from these failed to explain the whole of Uranus's movements, for from 1795 to 1822 the observed places continued, year by year to be in advance of those calculated, while from 1822 to 1830-1 a regression took place until the

tabular and observed positions agreed; and this regression uniformly continued in the years succeeding 1830-1, so that the hypothesis of some regular disturbing cause was the only one tenable, chance being eliminated, and the planetary deviations being too small to cast any doubt upon the validity of the gravitative and dynamical laws. At this point it was that Messrs. Le Verrier and Adams took up the question simultaneously, each, strangely enough, being in complete ignorance of the other's investigations; and their first resort was to analogy; for, knowing that the irregularities in the orbital movements of other planets were referable to the perturbing effects of mutual attraction, they concluded that the same thing obtained with regard to Uranus; that is to say, they inferred that all those disturbances which could not be accounted for by the influence of Jupiter and Saturn were caused by some planet hitherto unknown. But this was by no means sufficient, as mathematical considerations proved that any one of an infinite number of planets, varying in mass, distance, &c., would be capable of producing the deviations in question, so that the problem admitted of numberless solutions. It, therefore, became necessary still further to limit the question before any hope of arriving at a satisfactory answer could be entertained; and this was done by a wider application of analogy. It was assumed that the unknown planet resembled those already discovered, in the plane of its orbit being nearly the same, in the direction of its motion being similar, in its orbit being an ellipse differing but little from a circle, and in its mean distance from the sun agreeing with Bode's law of progression. Also, as it was assumed to be a planet of the solar system, it was supposed to move in accordance with Kepler's laws, and from all these hypothetical conditions, the mass of the planet sought, together with the elements of its orbit, could be calculated very precisely. This was accordingly done, and the results possessed a very high degree of probability, in consequence of the cogent analogical reasoning upon which they were based; so much so, indeed, that until something further could be obtained, the deduction might be assumed as true for all practical purposes. But it will at once be evident that the ques-

tion was susceptible of a complete settlement, as it was only necessary to calculate the position which the supposed planet would occupy on any given night, and then to look for it in that place, when, if the hypothesis were correct, the planet would be immediately *seen*. Consequently, "on the 23rd of September, 1846, Dr. Galle, one of the astronomers of the Royal Observatory at Berlin, received a letter from M. Le Verrier, announcing to him that the longitude of the sought planet must then be 326°, and requesting him to look for it. Dr. Galle, assisted by Professor Encke, accordingly did 'look for it,' and found it that very night. It appeared as a star of the eighth magnitude, having the longitude of 326° 52′, and consequently only 52′ from the place assigned by M. Le Verrier. The calculations of Mr. Adams, reduced to the same date, give for its apparent place 329° 19′, being 2° 27′ from the place where it was actually found." Thus the elimination of chance, combined with analogy, suggested a hypothesis, which assumed the rank of an established truth when the deductions from it received a complete verification.

b. Kirchhoff's Researches on the Solar Spectrum. In this case the phenomenon observed was the occurrence of various dark lines in the spectrum of a sunbeam, and to discover the cause of these constituted the question at issue. The method of Difference was first employed by showing that solid or liquid bodies, when heated to incandescence, emit rays which produce spectra differing only from the solar spectrum in the absence of dark lines: the inference drawn from this fact being that the cause of such lines must be sought among the conditions in which the two cases differed. Now it was evident that both kinds of rays proceeded from incandescent bodies, and also passed through the terrestrial atmosphere, but the solar rays, in addition to this, had to pass through the sun's atmosphere, and, therefore, in this latter condition the sought cause should be found; a conclusion which received additional strength from the analogical arguments of Sir David Brewster and Dr. Gladstone. In the next place, it had been found by experience that all transparent bodies emit, when incandescent, only those rays which they absorb when cold; thus, red glass if strongly heated appears green, yellow glass

appears purple, &c. It was also known that the spectra of incandescent *vapours* consisted simply of bright lines upon a dark ground; so, combining the two facts together, Kirchhoff conjectured that vapours comparatively cold would absorb the rays corresponding to such bright lines. Accordingly, he tried the experiment by causing the rays from a solid luminous body to pass through the vapour of sodium, and obtained a spectrum similar in every respect to that produced when no vapour was interposed, with the exception of two dark lines; these were found to be identical in position with the two yellow lines composing the spectrum of luminous sodium vapour. But, on examining the solar spectrum, two dark lines were therein perceived which corresponded exactly with those resulting from the absorptive power of vapourised sodium, and, therefore, it was evident that the presence of such a body was one of the conditions of the solar atmosphere. In a similar manner it has been ascertained that iron, nickel, calcium, magnesium, barium, copper, &c., all surround the sun in a state of vapour, and thus produce those dark lines which formed the subject of investigation. The argument may be thus thrown into a train of syllogistic inference:—

1. The facts observed being the production of uniform spectra by incandescent solids, and spectra with dark lines by the solar rays, we have the inductive syllogism, U U U:—

The difference of conditions is the cause of the difference of phenomena,

The solar atmosphere is the difference of conditions;

∴ The solar atmosphere causes the difference of the phenomena, viz., the dark lines.

2. A deduction from a law previously established, A A A:—

All transparent bodies when cold will absorb those rays which they emit when incandescent,

Sodium vapour is a transparent body;

∴ Sodium vapour when cold absorbs those rays which it emits when luminous.

3. This last conclusion is verified by experiment, and the facts now observed being the presence of two dark lines, both in the spectra from solar rays, and in those from incandescent

solids surrounded with sodium vapour, we construct a deductive syllogism in A A I, Fig. 3, based upon the two former :—

The cause of the two dark lines is sodium vapour,

The cause of the two dark lines is the solar atmosphere ;

∴ Some portion of the solar atmosphere is sodium vapour.

I may mention that I have here purposely abstained from the consideration of more causes than one being capable of producing the same effect, as, otherwise, the argument would become too perplexed for my present intention, viz., to give an example of simple logical processes when practically applied.

It would be easy to adduce many more instances of scientific discoveries, but the above, if thoroughly studied with a due recollection of the principles discussed in this treatise, will suffice to exhibit the method of analysing a complex argument into its logical elements ; and the student will be able to select for himself such other events in the history of philosophy as are well adapted for this purpose, thus putting his knowledge of mental laws to the test, and discovering what those particulars are which will be most advantageous for his individual pursuits.

§ 4. *Conclusion.*

Having now reached the end of our subject, it may not be amiss if we briefly consider the results which ought to flow from the study of a dissertation upon Logic. In the first place, we should be able to grasp the science as an organic whole, distinctly apprehending the nature of those inherent principles which compel the mind to think in one uniform manner, and forming a clear notion of the dependence which exists between them and our every act of acquiring knowledge. Secondly, we should have become accustomed to concentrate our attention upon the *process* of thought, without any reference to the matters about which it is employed. And, lastly, we should have learnt so to apply the practical principles which are deduced from a consideration of the primary mental laws, that without yielding to the blandishments of error, we may certainly attain the great temple of truth.

But I shall have written to very little purpose, if the reader be not in a position to recognise that great fact, the unity of philosophy, which, when once fully understood, lends a significance to all scientific truths, such as they otherwise would not possess; for it is the office of Logic to show that every ramification of our knowledge, however diverse, may ultimately be traced back to one parent stem; and, so far from the various sciences differing as regards their nature, it becomes a question as to whether the subjects concerning which they treat have any more than an apparent incompatibility. Therefore, he who would act in a truly philosophical spirit, must not remain satisfied with a crude, empirical acquaintance with isolated groups of facts, but should endeavour to obtain such general principles as may embrace them all; for then, not only would he obtain a more perfect knowledge of those facts themselves, but he would be enabled to gather many new truths, which, by any other method, must be lost for ever. And this may be observed in all the branches of learning: while the various facts are looked at in themselves, and by themselves, no great progress can be made; but immediately that laws, even of a comparatively limited nature, are discovered and borne in mind, then a vast impulse is given, the effects of which will speedily become apparent. At the same time, we should remember the intimate connection of reflection with observation, and endeavour not to cultivate one at the expense of the other.

Logic, then, may be considered as abstract philosophy, that system of which all other sciences are but the concrete manifestations; and, therefore, he alone can be justly termed a philosopher who has made himself acquainted with the laws that regulate the working of his own thoughts. But a mere acquaintance, in the ordinary sense of the word, will by no means suffice; for, as Archbishop Thomson observes, 'philosophy does not exist until the mind of the student begins to work for itself with the principles it receives historically; to decompose and to compose anew, to criticise the arguments employed, to essay at least to push the confines of truth farther into the wilds of error and ignorance, and to leave her a wider territory." In other words, we should not

become accustomed to acquiesce as a matter of course in the assertions with which we meet, nor to imagine that the subject is capable of no further development; but, by actively applying the powers of our own minds to the elucidation of the question, we should endeavour to ascertain the precise amount of truth which inheres in the principles laid down, and to add something however small, to the previously accumulated store of knowledge.

The end, accordingly, at which all should aim who desire the proper cultivation of their intellects, is rectification and progression—the correct adjustment of opinions already entertained, and the establishment of views more wide and lofty; for, as this can only be done by a recourse to the latent powers of their own understandings, it will assuredly result both in a surprising accession of vigour to the individual mind, and in great benefits to the world at large. Nor can it be doubted that the practice of thought, when duly controlled by the regular operation of its formal laws, must highly conduce in the promotion of mental calmness and sobriety: no longer led astray by the influence of passion, or deceived by the representations of the senses, the well-ordered intellect, secure and undisturbed, reviews by the light of necessary truth those facts which come under its notice, and delivers judgment in strict accordance with the immutable laws of nature.

In conclusion, I would remark that by far the noblest subject of human investigation is the human mind. The science of astronomy may give rise to emotions of awe and sublimity as we contemplate the vast infinitude of space, with its myriads of worlds and systems of worlds; geology may astonish us with its record of the marvellous forms of life which have successively inhabited the earth; the physical sciences may endue us with power so prodigious, as to become almost miraculous; but yet, the fascination which attends every inquiry into the nature of our own being, must always cause the study of mental philosophy to take its place as the most mysterious and attractive object of all our speculations.

APPENDIX.

A.

On Judgments.

In the body of this treatise, I have (p. 27) described judgment as "the act of determining by comparison, whether one idea is or is not included within another," and have referred it to the motive faculty of classification. But as the subject is one of great importance, and has much influence upon a due appreciation of logical science, I deem it advisable to append some further observations which shall enable the student to form a completer notion of the import which attaches to predication.

Now the most useful manner of introducing such remarks will be to criticise the most important objections which have been made to the above views; and for this purpose I shall select the following passage from Mr. Mill's "System of Logic," (vol. i. p. 104). "This theory appears to me a signal example of a logical error very often committed in logic, that of *ὕστερον προτέρον*, or explaining a thing by something which presupposes it. When I say that snow is white, I may and ought to be thinking of snow as a class, because I am asserting a proposition as true of all snow: but I am certainly not thinking of white objects as a class; I am thinking of no white object whatever except snow, but only of that, and of the sensation of white which it gives me. When, indeed, I have judged or assented to the propositions, that snow is white, and that several other things are also white, I gradually begin to think of white objects as a class, including snow and those other things. But this is a conception which followed, not preceded, those judgments, and

therefore cannot be given as an explanation of them. Instead of explaining the effect by the cause, this doctrine explains the cause by the effect, and is, I conceive, founded on a latent misconception of the nature of classification."

In the expression "when I say that snow is white," Mr. Mill evidently alludes to the formation of such a judgment *before* the conception of a class of white objects, for he says shortly after, "This [white objects as a class] is a conception which *followed*" the establishment of similar propositions; and as this is the ground upon which he charges the classificatory doctrine of judgment with error, his argument will be sufficiently refuted by showing that it is impossible to form the proposition "snow is white," before recognising white objects as a *class*.

And first, let Mr. Mill himself be brought forward as a witness: he says (vol. i. p. 30), "When we say snow is white, milk is white, linen is white, we do not mean it to be understood, that snow, or linen, or milk, is a colour. We mean that they are *things* having the colour." Therefore the meaning of the proposition is, so far, that snow is a white object. It must next be shown that we cannot think of "*a* white object," by itself, but that we always think of "*some* (or all) white objects," that is, of a class; and this may be done by a reference to the process of abstraction. For, as was seen at an early stage of our logical studies, it is necessary that such a process should be completed before we are able to possess any common notion or abstract term; and, therefore, the idea "white" is the result of comparison, reflection, abstraction, generalisation, and denomination, the first four of these being simultaneous, a fact which will become evident upon pushing our analysis a little further. Thus, suppose we had never obtained the idea of "white," or of any other common notion, and that we met with the object "snow:" the impression produced upon our senses would be a combination of such sensations as solidity, granular structure, absence of what is commonly termed colour, &c., but we should find it altogether impossible to separate this compound idea into its various parts; consequently, the only notion obtained would be an *intuition*, and we should be unable to form any other judgment than that "snow is snow." Immediately, however, that we met with any other intuition, say "milk," we should receive an immense acquisition to our knowledge; we should instinctively, as it were, compare them, and thus

perceive that although the two objects resembled each other in some respects, yet that they differed in others; that, for example, in one object a solution of molecular continuity was easily observable, while in the other such a condition did not obtain; that snow offered some resistance to a change of shape, while milk did not; but also that the intuitions produced by both were partly indistinguishable. This fact would compel us to recognise that the idea ("snow") which we had previously considered as simple, was in reality compound; or, in other words, that it was capable of division: for we should have sensible evidence that a part of it could exist without the remainder. Accordingly, we should see that snow and milk were separate objects, but yet, as far as our minds were concerned, partially identical; that is to say, we should recognise a *class* composed of two individuals. Now the whole of the preceding mental action would take place in equal progression, for with the commencement and advance of comparison, would commence and advance, *pari passu*, reflection, abstraction, and generalisation. But after this was concluded as far as would suit our more immediate purpose, we should take some measure to prevent our forgetting its results, and this would be the imposition of an abstract term, together with its correlative concrete. In the present case we should term that sensation in which both intuitions agreed, "whiteness," and then we should form the proposition "snow and milk are white objects;" or, in more detail, we should say, "snow is white, and milk is white." Therefore, it will be evident that no judgment (excluding such as are tautologous) can be formed without the conception of a class composed of at least two individuals; although, in most cases, a general name cannot be imposed until after the comparison of many objects, and the recognition of a proportionately larger class. But it must here be borne in mind, that when once we have gone beyond the idea of unity, there is no definite limit which we can impose upon our powers of imagination; and, accordingly, no sooner is a general notion conceived, than we regard the class as hypothetically infinite. This hint will, I hope, prove sufficient to prevent the opinion being entertained that classification is *merely* "an arrangement and grouping of *definite* and *known* individuals;" and that the doctrine above stated implies the theory, "that when names were imposed, mankind took into consideration all the individual objects in the universe, distributed them into parcels

or lists, and gave to the objects of each list a common name, repeating this operation *toties quoties*, until they had invented all the general names of which language consists." (Mill's "Logic," vol. i. p. 105.)

It has now, I apprehend, been irrefragably demonstrated that the classificatory doctrine of predication rests upon valid grounds, and that the objections considered above are untenable. Indeed, so simple and natural is the theory, that even Mr. Mill himself, when not engaged in actual combat therewith, implicitly affords his support to it, as witness the following passage:—"A child learns the meaning of the words *man* or *white*, by hearing them applied to a *variety* of individual objects, and finding out, by a process of *generalisation* and *analysis* of which he is but imperfectly conscious, what those different objects have in common." (Vol. i. p. 39.) If this mean that an abstract notion and its concrete cannot be formed from the observation of a single object—and certainly neither from the passage itself, nor from the context can I suppose any other signification intended—then the whole question at issue is granted, since the idea of a class is merely the conception of two or more individuals resembling each other in certain respects.*

I have already taken occasion to protest against Archbishop Thomson's exposition of judgment, but my remarks must not be held to refer to anything beyond the terminology employed, as it is possible that the doctrine so ambiguously put forth, may, in all essential points, be that of classification. Thus, speaking of the proposition "All men are animals," Dr. Thomson says, "We mean by our judgment, not that men and animals are just the same things, but that men are *contained in* [*sic*] the wider class animals." ("Outlines," p. 151.)

And as regards my own statement (p. 28) that the copula of a proposition signifies "the identicality of the subject and predicate, such *identicality* being, however, *limited* by the form of the proposition," I must refer the reader for a more complete explication of its import, to the foregoing analysis of the manner in which common terms are formed.

* It may be proper to observe that in the above quotations many of the italics are my own.

B.

On the so-called Immediate Inferences.

These are such arguments as were discussed under the heads of opposition, conversion, and coincident junction; and since a universal misconception appears to exist regarding their real nature, it may be worth while to present the reader with some additional information upon this point.

And first, it will be necessary to prove that an *inference* takes place in these processes, for many logicians exclude them altogether from the sphere of reasoning. Now, I cannot do this better than by adopting the words of Archbishop Thomson, a philosopher to whom the science of Logic is under very great obligations; and therefore, without further apology, I proceed to quote the following remarks:—

"Some logicians refuse the name of inference to this and similar processes [those named above], on the ground that 'there is in the conclusion no new truth, nothing but what was already asserted in the premises, and obvious to whoever apprehends them.' That the conclusion is *virtually* asserted in the premises, is true not only of these immediate inferences but of all syllogisms whatever; even in the inductive, the mere consequence—the act of concluding—brings in nothing which is not known potentially as soon as we have the whole grounds before us. So that the objection proves too much; as it would disqualify a set of inferences which no one thinks of rejecting. If, however, there is absolutely nothing new—if the concession of the premiss is not only a virtual, but an actual and express declaration of the conclusion, there is no inference, but mere repetition. But who can say that 'no unjust rulers are good' is a bare repetition of 'all good rulers are just?' In the one we affirm, in the other deny; in the one the subject of thought is 'good rulers,' in the other, 'unjust rulers.' They are, in these two points at least, distinct judgments, and as the passing of the one makes it possible, without further observation or decision upon facts, to collect the other, there is an inference. In many such cases, it is true, the inference is so obvious, so certain to occur upon the first glance at the premiss, that it seems needless to draw it out; but all the inferences we are about to specify are used from time to time, and this entitles them to our consideration."

The above passage will suffice for the establishment of the arguments in question as inferences; it now remains to prove that they are *mediate* inferences. And here it may be remarked as somewhat singular, that so acute a thinker as Dr. Thomson should have made such a near approach to the whole truth, and yet should have grasped but a portion; for it will be observed that although he clearly perceives the conclusion to result from a process of reasoning, he still maintains that it is dependent upon one premiss only; a doctrine which probably arises from the very fact that arrests his attention, viz., the obviousness and transparency of the inference—this rendering him loth to suppose the existence of a syllogistic deduction in so simple an operation, as, in like manner, it prevented the older logicians from admitting the presence of any reasoning whatever, no matter how supposedly direct it might be.

I shall, accordingly, proceed to enunciate the several principles upon which the validity of the inferred propositions rests; and if they are obviously essential, the doctrine here advocated must be admitted as established.

1. Opposition:—

a. Contradictory. *Any two classes must be either mutually and wholly exclusive or mutually and partially inclusive.* This canon is necessitated by the laws which regulate our thoughts, and therefore, as far as Logic is concerned, must be considered fundamental. Its meaning is that we cannot think of any two classes, except in one of the manners stated; and from it are developed these judgments:—"If E be true, I is false;" "If E be false, I is true;" "If I be true, E is false;" and "If I be false, E is true;" which respectively serve as major propositions in any particular case where this kind of opposition may be employed, the judgment operated upon serving as a minor. Thus, admitting the fact that "no men have wings," we must also admit that the statement "some men have wings" is false; for,

If E be true, I is false,
E ("no men have wings") is true;
∴ I ("some men have wings") is false.

Now, a moment's inspection will show that unless the major be here assumed, there can be no inference.

b. Contrary. *Neither the mutual and total exclusion of two classes, nor their mutual and partial inclusion, can be thought at the same time with their mutual and total inclusion.* By

development from this canon we obtain such majors as may be required, varying with the form of the original proposition; for example, if the position of A be employed as a minor premiss we may conclude that E, U, O, and Y are false, by employing the major "If A be true, then E, U, O, and Y are all false."

c. Subaltern. *Whatever relation exists between two classes, the same exists between any portions of those classes.* Here will be observed a modification of Aristotle's *dictum;* for when we assert that the whole of one class is or is not contained in another, we must also be able to assert that a portion of it is similarly characterised; and so on, to a full exposition of the canon, with its resulting majors.

d. Subcontrary. *Any two classes must be either mutually and wholly exclusive* (*when, by the last canon, we may assert them as mutually and partially exclusive*), *or they must be mutually and partially inclusive.* This canon is at once seen to be a corollary from the first and third; it can only refer to cases of I and O, the majors being respectively, "If I be false, O is true;" and "If O be false, I is true."

2. Conversion:—

a. Simple. *Those magnitudes which coincide are equal.* This canon, common both to geometry and logic, will hardly be questioned. The explication of its present import is that when two classes, or parts of classes, comprise the same objects, or when two individuals comprise the same ideas, they may at pleasure replace each other as subject and predicate in any form of proposition. We are, therefore, entitled to assume for majors, "If A be true, the corresponding Y is," etc.

b. Privative. *Every object of thought must be either a positive idea or its correlate privative.* Now, since these ideas are mutually and wholly exclusive, we are manifestly enabled to infer the presence of one from the absence of the other, and *vice versâ.* From this development of the canon, we must educe such majors as may be required from time to time; thus —

No immaterialities are material,
All forces are immaterialities;
∴ No force is material.

3. Coincident Junction:—

The canon of this doctrine is, "*Whatever is joined to one of two or more inseparable ideas, is joined to all.*" That is to

say, if we must always think simultaneously of two objects, and we think of one of these at the same time with a third, the other must in like manner be conceived. Accordingly, we may construct as many syllogisms as we please of the following form :—

Whatever may be added to the subject of an admitted proposition may at the same time be added to its predicate,

"Red" may be added to the subject of the admitted proposition, "metals are solids;"

∴ It may be added at the same time to the predicate —*e.g.*, "red metals are red solids."

Thus have I shown that every so-called immediate inference is, in reality, of a syllogistic nature; for let any of the above-mentioned majors be denied, and the conclusion is no longer valid. The object with which I set out is, therefore, attained; but ere I conclude, it will be useful to make a few brief observations upon some detached portions of the subject.

I have then to remark that as regards simple conversion, it must not be thought of as only applicable to tautologous judgments; for, as shown by the table given in page 45, every possible proposition may be simply converted. Nor must it be held that the convertend and its converse are the expressions of the same operations of thought; for confessedly, the respective *subjects* about which we think are different. Therefore, when, speaking of conversion, Sir William Hamilton states ("Logic," Appendix, V. c.) that "it is of no consequence, in a logical point of view, which of the notions collated" are "subject or predicate," he would appear either to have been bestowing too little attention upon the *process* of thinking, or to have expressed himself ambiguously.

I may also mention that Mr. Mill, who repudiates the notion of inference when applied to the above processes, has himself made a remark which affords a key to the whole question. He is alluding to "such considerations as these, that contrary propositions may both be false, but cannot both be true; that subcontrary propositions may both be true, but cannot both be false," etc., etc.; which the reader will immediately recognise as modifications of the canons above given; and says that "in this respect [*i.e.*, as involving general principles], these *axioms* of Logic are on a level with those of mathematics." He also implicitly terms them "elementary generalisations," but yet does not see that any one operation of opposition, etc.,

is as regular a deduction from a "general truth" as is any reasoning of geometry or algebra, which depends upon precisely similar axioms. (Compare Mill's "Logic," Book ii. chap. 1, § 2.)

C.

On the Dictum de Omni et Nullo

This canon I have enunciated (p. 8) in the following terms:—"Whatever is affirmed or denied altogether of any whole, may in like manner be affirmed or denied of any individual part belonging to, or comprehended in that whole;" and I have here used the word "whole" (the customary term being "class") in order that the principle might be more *obviously* applicable to syllogisms having singular terms. It will, however, be necessary to present in this place a more explicit view of the *dictum* than I have hitherto done; for otherwise, the objections frequently urged against that law might possibly be considered as unanswerable.

We have seen already (article A) that the notion of a class, or a "common notion," is the complex idea of an indefinite number of individual members all possessing the same characteristic, and also that the notion of an individual, or a "singular notion," is the complex idea of an indefinite number of attributes, most of them being class-characteristics, and all possessing the same unity of connection. Therefore, as a "class" and its "members" are, for all present purposes, precisely equipollent with an "individual" and its "attributes," I shall use the terms "whole" and "parts," which will serve equally well to represent either of the former pairs.

We are now able to perceive a fact which lies at the very root of the question, viz., that a "whole" is not composed merely of its "parts," but that it contains in addition the "unity" which obtains among them. And also—as was shown in the sections of this treatise which discussed the subjects of *formal* induction, deduction, extension and comprehension—we know that it is possible to direct at pleasure the major part of our attention upon either of the above con-

stituents of a "whole," upon the "unity," or upon the "parts."

Thus much premised, I have next to point out a very important distinction, viz., the relative powers of conceiving the "unity" and the "parts." The "unity" is obviously a *single* object of thought; the "parts" are, on the contrary, not merely a numerous, but an indefinitely numerous *collection* of such objects: therefore, while it is possible to form a clear and precise notion of the "unity," we can only obtain a vague and indefinite idea of the "parts." Hence it results that we can always direct a greater portion of our attention upon the "unity," than upon the "parts;" for that which we can perform more easily, we can perform better; and as a corollary, we see that the natural disposition of the mind is to regard the "unity" as pre-eminent, the "parts" as subordinate.

The *dictum* results from the facts thus proved: it asserts that whatever is recognised as belonging to, or excluded from, the "whole," when principally looked upon as the "unity," will be found to hold the same relation, not to the "parts" in a body—for they, although vaguely conceived, yet form an essential constituent of the "whole," and are at least *co-extensive* with "unity"—but to any *one* of the "parts," no matter whether it be already known as individually existing, or whether it have yet to be rescued from the depths of indefinity. And as I have formerly shown that all judgments are classifications (Appendix A), and that all reasoning whatever may be exhibited in syllogisms (*passim*)—these doctrines, taken in connection with the proof just now afforded, that the *dictum* is a necessary law of thought, will, I apprehend, make it evident that the Stagirite's canon is the organic principle of all inference.

That the above remarks were not altogether uncalled for, I shall show by quoting the following passage from Mr. Mill's "Logic" (Book ii. chap. ii. § 2); my reason for selecting this author being that he is one of the ablest and best known of the logicians adopting similar views:—

"Now, however, when it is known that a class, an universal, a genus or species, is not an entity *per se*, but neither more nor less than the individual substances themselves which are placed in the class, and that there is nothing real in the matter except those objects, a common name given to them, and common attributes indicated by the name; what, I should

be glad to know, do we learn by being told, that whatever can be affirmed of a class, may be affirmed of every object contained in the class? The class *is* nothing but the objects contained in it; and the *dictum de omni* merely amounts to the identical proposition, that whatever is true of certain objects, is true of each of those objects. If all ratiocination were no more than the application of this maxim to particular cases, the syllogism would indeed be what it has so often been declared to be, solemn trifling. The *dictum de omni* is on a par with another truth, which in its time was also reckoned of great importance, 'Whatever is, is.' To give any real meaning to the *dictum de omni*, we must consider it not as an axiom, but as a definition; we must look upon it as intended to explain, in a circuitous and paraphrastic manner, the meaning of the word *class*." The italics here are Mr. Mill's.

In what points the above passage differs from the doctrine previously advocated, and which view is supported by the more weighty arguments, are questions that must be left for each reader to decide for himself. Suffice it if a clear statement of the facts involved has been put forward.

I have frequently spoken of Aristotle's *dictum* as being the fundamental law of inference; but I should here wish to qualify that expression by stating that I do not use the word "fundamental" in its most explicit sense; that is to say, I do not imply the non-existence of some more recondite and general principle. My only meaning is, that for all logical purposes, it will be sufficient to consider the *dictum*, *i.e.*, the practical law by which the motive faculty of classification works, as the ultimate principle of thought as thought: to the end that we may not be compelled to encroach upon metaphysical ground.

In this connection it may be useful to mention that by many writers the fundamental laws of thought have been given as follows:—

1. The Law of Identity. "A concept is equal to all its characters," or, "A thing is equal to itself."

2. The Law of Contradiction. "What is contradictory is unthinkable."

3. The Law of Exclusion. "Either a given judgment must be true, or its contradictory; there is no middle course."

4. The Law of Sufficient Reason. "Whatever exists or is true, must have a sufficient reason why the thing or proposition should be as it is, and not otherwise."

I shall content myself with having called the reader's attention to these laws, and shall not attempt to discuss them in the present place. I may, however, refer to Sir William Hamilton's fifth and sixth lectures upon Logic, as containing an able analysis of the principles in question.

D.

On the Syllogism considered as a Petitio Principii.

The form which this objection to the syllogism generally assumes is thus stated by Mr. Mill :—

"It must be granted that in every syllogism, considered as an argument to prove the conclusion, there is a *petitio principii*. When we say,

All men are mortal,
Socrates is a man ;
Therefore,
Socrates is mortal ;

it is unanswerably urged by the adversaries of the syllogistic theory, that the proposition, Socrates is mortal, is pre-supposed in the more general assumption, All men are mortal: that we cannot be assured of the mortality of all men, unless we are already certain of the mortality of every individual man: that if it be still doubtful whether Socrates, or any other individual you choose to name, be mortal or not, the same degree of uncertainty must hang over the assertion, All men are mortal: that the general principle, instead of being given as evidence of the particular case, cannot itself be taken for true without exception, until every shadow of doubt which could affect any case comprised with it, is dispelled by evidence *aliundè*, and then what remains for the syllogism to prove? That, in short, no reasoning from generals to particulars can, as such, prove anything; since from a general principle we cannot infer any particulars, but those which the principle itself assumes as known."

"This doctrine," Mr. Mill goes on to add, "appears to me irrefragable," and the mode of issuing from the difficulty which he adopts, is to deny that the syllogism as such is an

inference. He asserts that the same evidence which enabled us to infer the general truth "All men are mortal," would equally enable us to draw the particular conclusion "Socrates is mortal;" and that a true representation of the reasoning process which takes place, would be to say that as Solon, Lycurgus, Pisistratus, and other individuals possessed the attribute mortality, and as Socrates resembles those individuals in his possession of the attribute humanity, he will therefore resemble them in being mortal. This "type of ratiocination," says Mr. Mill, "does not claim, like the syllogism, to be conclusive from the mere form of expression; nor can it possibly be so. . . . . Whether, from the attributes in which Socrates resembles those men who have heretofore died, it is allowable to infer that he resembles them also in being mortal, is a question of induction; and is to be decided by the principles or canons which we shall hereafter recognise as tests of the correct performance of that great mental operation."

It will thus be seen that in refusing the name of inference (strictly speaking) to syllogistic reasoning, and in referring it to induction, Mr. Mill evidently considers the latter as altogether different in nature from the syllogism. It would not be difficult to quote other passages to the same effect, thus—"This was induction, but bad induction; just as a vicious syllogism is reasoning, but bad reasoning," where the processes of induction and syllogism are contrasted. Consequently, the theory of induction maintained in the body of this treatise, is directly at variance with the views just stated; for I have endeavoured to show that the inductive process is merely a peculiar species of deductive (syllogistic) inference, and depends altogether upon reasonings which assume the form of syllogisms. It is necessary, then, to produce some considerations which shall serve to establish the fact that Mr. Mill is mistaken in supposing induction to be independent of syllogism.

Now this point may, I think, be proved by using Mr. Mill's own words. First, as regards inductions in general, I find the following statement:—"It hence appears that if we throw the whole course of any inductive argument into a series of syllogisms, we shall arrive, by more or fewer steps, at an ultimate syllogism, which will have for its major premiss the principle, or axiom, of the uniformity of the course of nature." A passage like this might apparently be held as

an admission of all that I require to prove; I shall, however, push the matter a little further, and ask, Upon what does Mr. Mill rest his "ultimate major premiss?" The answer I find to be, "We arrive at this universal law, by generalisation from many laws of inferior generality." But here another step presents itself, which leads us to inquire what it is that gives validity to this last-mentioned "generalisation," which is described in another place as being an "induction by simple enumeration—in other words, generalisation of an observed fact from the mere absence of any known instance to the contrary;" or, to vary the expression, what makes us certain that the conclusion to which this generalisation conducts is true? The only approach to a reply which Mr. Mill gives, is as follows:—

"The considerations which, as I apprehend, give, at the present day, to the proof of the law of uniformity of succession, as true of all phenomena without exception, this character of completeness and conclusiveness, are the following:—First, that we now know it directly to be true of far the greatest number of phenomena; that there are none of which we know it not to be true, the utmost that can be said being that of some we cannot positively from direct evidence affirm its truth; while phenomenon after phenomenon, as they become better known to us, are constantly passing from the latter class into the former; and in all cases in which that transition has not yet taken place, the absence of direct proof is accounted for by the rarity or obscurity of the phenomena, our deficient means of observing them, or the logical difficulties arising from the complication of the circumstances in which they occur; insomuch that, notwithstanding as rigid a dependence on given conditions as exists in the case of any other phenomenon, it was not likely that we should be better acquainted with those conditions than we are."

Accordingly, the *observed* ground for the conclusion that all phenomena have a cause, is the fact that *some* have; but there is no reason assigned for such an inference being valid. I can therefore only suppose that Mr. Mill implies the existence of some mental law which assures us of a particular uniformity so characterised being sufficient to warrant the truth of the corresponding general uniformity. And this view is borne out by such statements as this—"The unprompted tendency of the mind is to generalise its experience provided this points all in one direction," which are to be

frequently met with in the work quoted. The result, then, at which we finally arrive, is that the mind supplies a general law, according to which, if certain facts are ascertained by observation, a fixed conclusion must be obtained. Let us state this mental law, the observed facts, and the conclusion in the order named, thus :—

A case of a certain particular uniformity is a case of the corresponding general uniformity,
The case of some phenomena being caused is such a particular uniformity ;
∴ The case of some phenomena being caused is a case of all phenomena being caused.

This evidently is nothing but a syllogism, and indeed is precisely the same syllogism as that to which, in the body of this treatise, I traced all induction. A comparison of the investigation then followed out, with that just concluded, will thus show that Mr. Mill implicitly, and myself explicitly, are agreed in considering induction as but a species of syllogistic inference.

It now remains to prove that the syllogism is not obnoxious to the charge of depending upon a *petitio principii ;* and this may, I think, be done in two ways. First, making use of the fact recently established, that all reasoning whatever is syllogistic, it can fairly be maintained, that even if it were impossible to directly point out any flaw in the argument supporting the charge ; yet there must of necessity be one somewhere, or otherwise no valid inference could ever exist. But, secondly, the alleged fallacy may be disposed of, in the following manner, by a reference to the simple processes of thought.

Taking the example already used, *i. e.*, "All men are mortal, Socrates is a man ; therefore, Socrates is mortal," let us consider whether or not the major premiss *alone* contains the conclusion. The subject is the class "man" taken universally, that is, as a whole, and accordingly, the object which occupies our thoughts is composed principally of the unity "humanity." The predicate is the class "mortal things," considered mainly with reference to a portion of its "parts ;" and the import of the entire judgment is that "humanity" is one of the unities possessing "mortality," and that the parts which are connected together by humanity form a complex portion of the parts connected by mortality. Now the only assertion which is here made respecting individual objects is

that any case of "*humanity*" is a case of "mortality," and therefore it is *not* implied that any *intuition* such as Socrates, Plato, or Junius, is mortal, *until* such intuition has been analysed and found to contain "humanity." Then, indeed, I grant, the major premiss implies the conclusion; *but then*, it must be borne in mind, we are also in possession of the *minor premiss, without which the conclusion would not be so implied.* Accordingly, the major tells us that the *general notion* "man" forms a portion of the general notion "mortal things;" the minor, that the *intuition* Socrates forms a portion of the general notion "man;" the conclusion, that the *intuition* Socrates forms a portion of the general notion "mortal things." And thus it will also be seen, that both the major and minor premises *separately* contain the conclusion *when* both are admitted; but that, unless this be the case, *neither* of them does. Therefore, as *both* premises are essential to the conclusion, there is no *petitio principii.*

The above is necessarily but a mere outline of the argument by which the syllogistic theory, as ordinarily, and I apprehend, justly received, may be defended. The full details cannot here be set forth, and therefore I must ask the reader to supply them himself, a task which will be easy when once he is in possession of the key to the whole question, viz., when he perceives the distinction which must be made between an *intuition as an intuition*, and an *intuition resolved into its constituting general notions.*

In this article, the work quoted from is Mr. Mill's "Logic," and I annex a list of the passages referred to, in the order of their occurrence above.

Book ii. chap. iii. § 2.
Do. do. § 7.
Book iii. chap. iv. § 3, note.
Do. chap. iii. § 1.
Do. chap. xxi. § 2.
Do. do. § 4.
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THE END.

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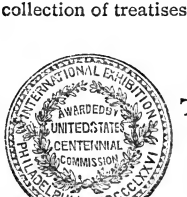

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A

SYLLABUS OF LOGIC,

IN WHICH

THE VIEWS OF KANT ARE GENERALLY ADOPTED, AND THE LAWS OF SYLLOGISM SYMBOLICALLY EXPRESSED.

BY

THOMAS SOLLY, Esq.

LATE OF CAIUS COLLEGE, CAMBRIDGE.

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PREFACE.

THE object which I have proposed to myself in writing this Treatise on Logic, is the combination of a brief but complete account of the Aristotelian system, with some of Kant's philosophical views of the nature and divisions of the science. With respect to the first-mentioned part of my task, I have endeavoured to give a strictly *à priori* character to the derivation of the fundamental laws of syllogism, and the results of their combination in the various forms of reasoning. This is attempted, partly by employing a method in the derivation of these laws of a rather more exhaustive character than that which has usually been adopted by logicians,

and partly by introducing mathematical analysis, for the exhibition of the symmetry in their forms. Symbolical representation is also employed in the second section of the Introduction, for the purpose of explaining the nature of abstract conceptions, and the method of thinking some of them purely, or independently of sense.

I have derived from the *deductio ad absurdum* the grounds for a division of the twenty-four categorical syllogisms into eight systems of three each. By means of this arrangement, which to the best of my knowledge is entirely new, the equality of the number of sound moods in the first three figures, and several other properties of categorical syllogism, may be demonstrated *à priori* without the assistance of symbolical reasoning. And although these results admit of no immediate application to practice, yet are they useful in giving the student such firm hold upon the fundamental principles of the science, that they will never afterwards desert him. Besides, it should be considered a sufficient merit that they add a theoretical completeness to the science, which it can never obtain when the symmetry of

its results is arrived at by empirical methods alone.

There is another subject which has been very much neglected in all the works on Logic with which I am acquainted. Aristotle's Analytics is the only book in which I have discovered any attempt at a theory of the modality of syllogism, and on this particular point he appears to me to have failed. I have accordingly devoted an entire section to the consideration of this subject, at the end of the second book, in which I have endeavoured to expose the fallacious nature of his reasoning. It must, moreover, be remembered, that this subject is one of the most important connected with Logic, for any misconception respecting it may give birth to fallacies of a very complicated nature, and extremely difficult to detect. Perhaps not a few of the errors on the nature of the will might be ultimately traced to this source.

I will now mention as briefly as may be the extent to which I am indebted to Kant, or rather his translators, for it is by their means alone that I have had any access to his works.

The division of the science into Transcendental and Universal, (for the latter of which terms I have substituted 'Formal' as being more generally intelligible) is adopted from the Criticism, and cannot perhaps be entirely comprehended without a reference to that work. The first part of the second section in the Introduction, and a great part of the third, are little more than an abridged paraphrase of some portion of his Logic. There are also several other places throughout the Introduction which have at least originated in some idea derived from his works, though it is impossible individually to specify them here.

In the first book, which contains the merely formal analysis, I have adopted the opinion of Kant respecting the distinct nature of Categorical, Hypothetical, and Disjunctive propositions. But as the latter part of the first book is entirely opposed to his opinion on the philosophical correctness of the distinction of figures, it will be necessary to account for my having thought proper to retain the scholastic theory on that subject. Many other reasons might probably be urged

in favour of this view, but one alone is amply convincing to myself. The *deductio ad absurdum* can only be applied to some syllogisms in the first figure, by the introduction of those moods of other figures which cannot be reduced to the first by conversion; and the indirect proof of these syllogisms would only restore the original syllogisms in the first figure. There are one or two other points in which I have not followed Kant, and which are immediately consequent upon the adoption of the system of figures. These it is not necessary to specify here; for if the reader is acquainted with the works of that philosopher, he will readily detect them for himself; and if he is not, he would not understand my explanation.

Material fallacies, ambiguous terms, and many other similar subjects which are usually considered in works on this science, have found no place in the following pages. All these subjects have been already discussed by Dr. Whately in such a very able and lucid manner, that nothing more remains to be said about them. And even had this not been the case, my silence respecting them could not have

been considered an omission, as they never entered into the plan of my work.

I have attempted little more than an analysis of the formal laws of reasoning, and how far this attempt has been attended with success, the reader can now determine for himself.

Cambridge, May 13, 1839.

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ERRATA.

Page 4, *lines* 5 and 7, from the bottom, *for* "represented," *read* "imaged."

Page 40, *line* 1, *for* "cognitions," *read* "representation."

Page 89, *lines* 5, 6, in the table, dele "Subject Premiss."

Page 108, *line* 10 from bottom, insert "not" between "B" and "being."

A

SYLLABUS OF LOGIC.

INTRODUCTION.

SECTION I.

ON THE NATURE AND DIVISIONS OF THE SCIENCE.

(1.) The subjection of the Understanding to certain invariable laws is the first indispensable condition to all knowledge. Kant has shewn, in his Criticism on the pure Reason, that the mind legislates for matter, or in other words, that the laws we discover in the external world derive their very possibility from the laws of Mind. But let us for an instant imagine the possibility of nature following fixed laws as an object of our senses, quite independently of any laws in our understanding, which for argument's sake we will suppose to be without them. It is evident that upon this hypothesis the Understanding could never take cognizance of these

laws of nature, nor even of the existence of the objects they concerned. For these objects can only become known to us by means of certain laws, according to which we can severally distinguish them from each other: and how could we even distinguish between ourselves and nature, or between the 'me' and the 'not me,' without some law in the faculty by which objects are known?—Every change in our representations might either arise from a change in nature, or from a change in our own indeterminate state. But even could we separate ourselves from nature, there would still remain the question, 'How can we conjoin any phenomena in a synthesis for the purposes of knowledge, unless we are conscious of something fixed and determinate to which we can refer all the phenomena to be conjoined, and also of some law for the mode of their conjunction?' Without these requisites the cessation of the phenomena and of their conjunction in the mind must be simultaneous. And, moreover, even while the phenomena lasted, no act of conjoining them in any one instant of time could ever be considered the same as, or be united with a similar act of conjoining them in any succcessive instant, unless we were to grant something fixed in our consciousness, and

quite independent of time, as a common ground for the unity of these successive syntheses. Hence, upon every hypothesis, the legality of the knowing faculty is a necessary condition to its use; and it now only remains to extend this remark to the other logical faculty —the Constructive Reason.

(2.) The Understanding has been defined by Kant, as 'the faculty of rules;' by Coleridge, as 'the faculty of judging according to sense.' Its operation may be considered as two-fold, accordingly as it dissects a representation by analysis, or conjoins several representations in a synthesis. But there can be no act of analysis without the consciousness of a prior synthesis; and hence it follows, that the latter is an indispensable condition to every act of the faculty. Now the Reason, considered as to its logical use, (its transcendental use has nothing to do with our present purpose, and need not be considered here,) differs from the Understanding in this: Whereas the Understanding merely conjoins the diversity of representations in synthesis, or dissects them by analysis, in either case referring this diversity to the unity of consciousness; the Constructive Reason on the other hand conjoins the very unities of these syntheses, which unities are acts in the consciousness

or logical functions of the Understanding, and entirely distinct from the diverse representations contained in them.* But as this kind of reasoning is rather difficult to comprehend in the abstract, we shall endeavour to explain our meaning by an example:—If any person were to state the two propositions, 'all tyrants are unhappy,' and 'Nero was a tyrant,' my Understanding alone could never have enabled me to discover that 'Nero was unhappy.' For this faculty unaided by the Reason could only conjoin certain conceptions according to a rule. For instance, I

* If we might be permitted to offer an illustration of so abstract a subject, we would represent the synthesis of representations in the Understanding by the arc of a circle connecting two points, whose centre or unity of the syntheses may be of course at a finite distance. But if another point be taken in the same right line with the first two, we can only join all these points, and make the centres of the two arcs correspond, by placing the common centre at an infinite distance, where it will represent the Reason conjoining the unities of the syntheses of the Understanding. It must also be observed, that as on the one hand the centre of this circle is infinitely distant, but its arc, which is a straight line joining the three points, is finite and determinate; so on the other hand the rational act of conjoining the unities of the syntheses of the Understanding transcends all possible experience, and cannot be represented, but can only be thought, whereas the synthesis, which results from the act of reason, is quite as easily represented as those from which it was originally derived. We are perfectly aware of the manifold objections which might be urged against this illustration, but we are inclined to think it may, in some measure, assist the reader in comprehending the idea we wish to convey.

may severally conjoin the conceptions of unhappiness and Nero with the conception of tyrant, as in each case belonging to the same subject: but in order to conjoin the two extreme parts of these judgments, namely, Nero and unhappiness, I must simultaneously reflect on my previous conjunction of each of them with the conception of tyrants, and therefore on the two acts of the Understanding by which these judgments take place. Before then I can arrive at any conclusion from the two given propositions, I must possess some faculty by which I can conjoin the very acts of the Understanding that are contained in them, and this is what is meant by the Constructive Reason.

The ease with which the Reason arrives at a conclusion from judgments that have been reduced to their most simple logical form, and the perfect similarity of such a conclusion when obtained to any immediate act of the Understanding, are circumstances which have rendered the peculiar function of the Reason, in its logical use, extremely liable to be overlooked. But a little attention to the subject will make it evident, that the conjunction of the acts of the Understanding requires quite another faculty than that of the Understanding itself, which merely conjoins

the parts of possible experience according to rules.*

Having given this short account of the logical use of the Reason, we shall now proceed to shew that its functions are entirely determined by laws. For as the conclusions of the Reason are constructed with materials derived from the use of the Understanding, they can only concern the objects of the latter faculty, and must in their intrinsic nature be possible as its immediate acts. But this harmony of the two faculties can only be secured by the subjection of the Reason to laws. Here then at length we are justified in assuming, that the whole use of our intellectual and rational faculties is based upon certain universal laws, and that the Science which treats of them is not a mere chimera of the imagination, but founded on a reality which is the primary condition to all other knowledge whatever.

* After the author had written his account of the logical use of the Reason, he met with the following passage from Kant. It refers, however, to the whole use of the faculty:—

"The Understanding may be a faculty of the unity of phenomena by means of rules; Reason is thus the faculty of the unity of the rules of the Understanding under principles. Reason, therefore, never refers directly to experience, or to an object, but to the Understanding, in order to give to the diverse cognitions of this, unity *à priori* by means of conceptions, which may be termed unity of Reason, and which is of quite another kind to that which can be derived from the Understanding."—*Anonymous Translation of Kant's Criticism.*

(3.) The laws of the use of the Understanding must be *à priori*, and cannot be derived by the method of induction from any number of mental phenomena. For it has been shewn that they are necessary to all use of the Understanding, (as it cannot even determine an object without them,) and consequently to experience itself; and we should therefore be guilty of a glaring circle in our reasoning, if we endeavoured to derive from experience those laws which have previously been made the very grounds of its possibility.*

But if the laws of the Understanding are

* The commonest example of this most fallacious attempt to deduce the pure conceptions of the Understanding from experience, is to be found in the grounds that are sometimes given for the causal relation of phenomena. For instance: *Q.* Why do I expect a spark from the concussion of flint and steel? *A.* Because in all past time such a concussion has been immediately succeeded by a spark.—*Q.* But why does this succession having taken place in all past time, give me any right to expect that it will take place again? *A.* Because any succession that has taken place very often, has been afterwards observed to take place again. And if we were to ask for a reason, why the uniformity of nature up to the present moment should be considered as any guide for the future, we should get precisely the same answer, or in other words, the fact would be stated as the ground for itself. And we might thus continue the question and answer to infinity, without ever getting any nearer the point. The difficulties of this subject were first brought to light by the subtilty of Hume. And although he never succeeded in offering any satisfactory solution of them, yet his "sceptical doubts" aroused the attention of Kant, and became the occasion of the Criticism on Pure Reason, in which the difficulty is satisfactorily explained.

independent of all empirical matter, *à fortiori* must this be the case with the formal laws of the Reason, which simply regard the conjunction of the acts of the former faculty, and are therefore removed one step farther from their empirical contents. Hence it follows that both Reason and Understanding are entirely self-regulated, or subject to *à priori* laws. And the determination of these methodically, and their arrangement in a system, is the business of Logic in the widest acceptation of the word.

Division of Logic.

(4.) Logic is divided by Kant into Transcendental, and Universal or Formal.*

Transcendental Logic agrees with Formal in excluding all consideration of particular objects, but differs from it in admitting that of the pure conception of an object in general.

Formal Logic entirely excludes all consideration of the objects thought, and merely re-

* The reader who has no acquaintance with the Kantian system, must not be surprised if he does not clearly understand the distinction between these branches of the science. As, however, Formal Logic is exclusively the subject of the first book, and a few considerations from Transcendental are introduced in the second—the two books together may throw some light upon the nature of the division in question.

gards the form of our judgments, and their relations to each other.

It will be seen from the above definitions that Transcendental Logic embraces a very wide field, and includes within its limits much that is metaphysical, and entirely foreign to the other branch of the science.*

As Formal Logic alone is the proposed subject of this treatise, we should have been justified in taking leave of Transcendental Logic here: but certain limitations are imposed upon the very forms of the judgments of the Understanding by conceptions which are peculiar to the last-mentioned science. And although they may be justly assumed in every treatise on Formal Logic, yet, as they are the origin of several very peculiar results,† we thought the notice of them in our second book might be deemed not wholly superfluous.

(5.) This apology has been offered for an intended reference to what properly lies out of the sphere of the subject, on account of the great injury which the sciences must in-

* For instance, the conceptions of substance, causality, &c.

† Some of the limitations are alluded to in the commencement of the first book. The absence of a formal proposition of identity is one of them. For if we say A is B, we do not know but that other things may be B also. One of the peculiar results is the "possibility of a true conclusion from false premises in every form of reasoning."

variably incur whenever their boundaries are not strictly recognised. Formal Logic has, perhaps, suffered more on this score than any other science: for, to say nothing of many encroachments on the side of Transcendental Logic, it has been a common custom with logicians to introduce into their treatises a great deal of matter derived entirely from empirical psychology, which is a distinct branch of knowledge. Thus, the choice and arrangement of arguments, the best application of particular syllogistic forms, and other similar considerations, have frequently been made the subject of rules which can only be derived from practice, and should never be mixed up with Logic, which is an *à priori* science. Observations of this kind can never form part of a system, but are merely an aggregate of information, which is very useful no doubt, but belongs more particularly to the Art of Rhetoric. Knowledge of this kind may properly be termed an art, and so far the old logicians were at least consistent. But this term can never be applied to Logic without an absurdity as manifest as if we were to speak of the Art of the Differential Calculus, or Conic Sections.*

* We have thought it better to put a few observations on Dr. Whately's Definitions of Logic in a notice by themselves at the end of this section.

(6.) Logic is not an organum of the sciences; for it does not contain a single reference to any one branch of knowledge, and therefore has no resting-place or fulcrum from which to commence its investigations: it is however of the greatest use in testing the work of another organum, by exposing all its results. When a new law has been arrived at by Induction, Logic will determine all its consequences; and should one of these prove at variance with truth, it is certain that the induction is erroneous, and that new observations are necessary.

Notice on Whately's Logic.

(7.) As the distinction between the theory of Logic and its application to practice has been well explained in the very valuable treatise by the Archbishop of Dublin, we cannot help feeling in some measure surprised that he has united these very different subjects in the same definition. In the introduction to his work, Dr. Whately defines Logic as the "Science, and also the Art of Reasoning;" and afterwards explains in a note, "that as a science is conversant about knowledge only, an art is the application of knowledge to practice." Now it follows from the latter unobjectionable definition, that the rules for the art must be merely practical, and derived

from the experience of "how we reason best," or in other words from empirical psychology; for if they were *à priori*, they would *ipso facto* become laws of the science. Hence we see that the rules of the art, which are all empirical and depend on observation, differ from the laws of the science, which are *à priori* and derived from the reason, not only in their use and nature, but also in their origin. The question however is not one of fact, or even of theory, as Dr. Whately has himself introduced the very distinction for which we are contending: but the question *is*, whether that arrangement can be considered conducive to the interests of science, which combines under the same name two branches of knowledge whose nature and origin are equally distinct from each other.

(8.) There are two other passages in Dr. Whately's work, which appear to the author to contradict each other, and to convey equally false notions of the nature of the science. Soon after the definition upon which we have just commented, Dr. Whately adds, "Its most appropriate office however is, that of instituting an analysis of the process of the mind in reasoning." Now it is not the process of the mind in reasoning, but the principles with which that process must accord, that is the proper object of

Logic.* We hardly ever reason to ourselves in syllogism, but only in a manner which agrees with its laws. For instance, if I think of the future death of a hale and hearty man, in whom there do not appear the slightest symptoms of decay, I do not consider it a merely probable circumstance, but morally certain. Now this conclusion could only be logically deduced by my virtually assuming the proposition that 'All men must die,' and therefore that John being a man must die also. But although the actual law which connects humanity and mortality must have been thought in my mind, when I first considered it as morally certain that John must die, yet the proposition that 'all men must die' (which is, as it were, the exponent of the law) had, in all probability, never occurred to me: perhaps, indeed, so far from thinking of all mankind, I had not thought of any other person than John. We see then that the object of Logic is not the actual process of our reasoning, but rather the principles to which that process can always be referred.† And it must be remembered that

* Dr. Whately admits that Logic "investigates the principles on which augmentation is conducted;" and had his definition terminated here, it would not have been liable to any objections.

† The simple state of the case is this: In the actual process of our minds we generally connect the mere conceptions in a law, without thinking of all that is contained in their sphere. But

this is no unimportant point in the definition of Logic, as an erroneous conception on this head is extremely calculated to bring the science into disrepute. For, if any one discovers that the process of reasoning in his own mind is rarely, if ever, in the form of a complete syllogism, he immediately leaves the science with the conviction that it certainly does not contain the principles of all reasoning, and probably not of any.

(8.) The other passage to which we would allude, is to be found in a note near the commencement of the second book, in which Dr. Whately states, that "Logic is entirely conversant about language."

This appears to us to be at variance with the passage we have just quoted, in which the most appropriate office of Logic is said to be the analysis of the process of the mind in reasoning. Now, that language follows certain laws, is unquestionably true. But whence do these laws arise, unless from the necessity

in the logical development we consider the aggregate of individuals that come under the conception contained in the subject of an universal proposition. As, for instance, in the above example, if I look at John and think of his future death, I merely connect the conception of death with that of humanity, to the conditions of which I see that he corresponds. But if I am asked to express logically my reasons for expecting his death, I immediately commence with 'All men die,' &c.

of language conforming itself to the mental laws of which it is the exponent? If language did not receive its stamp from mind (the laws of which we assume to be universally the same in all countries and ages), we could never be certain that we might not at some future time meet with a people whose language required quite a new logic, and in that case the science would lose its *à priori* character, and rest on probability alone.

SECTION II.

ON COGNITION.

(10.) COGNITION is the generic name for all representations that are sufficiently completed for the logical use, and must therefore contain a reference to our consciousness on the one hand, and to an object on the other.

If a cognition contain sensation, it is empirical; if it does not, it is pure.

Cognition may be divided into the two species—Intuition and Conception, each of which may be either pure or empirical.

Intuition is a merely sensual* cognition of an object.

Conception is an intellectual cognition, and refers to many objects.

Perhaps we can exhibit these co-divisions of cognition in a more intelligible manner by means of the following scheme:—

COGNITION TABLE.

	INTUITION.	CONCEPTION.
Pure.....	A straight line.	Substance.
Empirical..	A horse that is seen.	Abstract conception of a horse.

* Pure Intuitions concern the mere forms of the Sensitivity, Space, and Time, and are therefore sensual without containing sensation.

To investigate the ultimate original of cognition, and shew by what process a merely sensual representation obtains objective validity,* and thus becomes an intuition, is entirely foreign to our present purpose, as it belongs to the science of Metaphysics. We shall therefore only explain that formal property of our cognition upon which its logical perfection mainly depends, and conclude the section with investigating those logical acts of the understanding by which it arrives at conceptions.

(11.) Cognition may be divided into distinct and indistinct.

Indistinct cognition is that in which a diversity is thought, that is not exhibited objectively to the consciousness.

Distinct cognition, on the contrary, is that in which no diversity is thought, which is not exhibited objectively to the consciousness.

Let us take an example of an indistinct intuition.

While walking on the sea-shore, I perceive a large object in the offing, which, from its general appearance, I immediately know to be a ship. Now, from my previous knowledge of

* We give objective validity to a representation, when we conceive it to arise from something independent of the peculiar state or nature of our own mind, and therefore believe that other people would view it as we do.

the construction of a ship, I know that it must have a rudder, shrouds, and a great variety of tackle, which are not to be found in the image as it appears to me, although I must really see them: I therefore say that my intuition of the ship is indistinct. If, on the other hand, I had never seen a ship before, and had no conception of the nature of the object presented to me, I should say that my intuition of the object was distinct; and this would arise from my ignorance of what there was in it to distinguish. But if any person then asked me 'if I could see what the object was?' the question 'what?' would superadd in my mind a conception of this object, having some nature peculiar to itself, or having been made for some particular purpose, which was not exhibited to me in my intuition, and I should therefore answer that I could not see distinctly what it was.

Hence we see that an intuition is indistinct, when it suggests a conception of the diverse, which it does not exhibit objectively to the consciousness. And it is the relation of our conception to the representation, and not the latter alone, upon which distinctness must depend. For if distinctness were defined as the consciousness of the diversity of the representation, without introducing any limitation

to this diversity, distinctness would be impossible, as the diversity in any object is infinite, and can never be exhausted.*

In the same manner we say that a conception is indistinct, when we attach to it the conception that an analysis of it is possible, or in other words that it contains a diversity, and yet cannot dissect, and severally represent to our consciousness† the parts of this diversity. For instance, we may be said to have an indistinct conception of the nature of the human mind, when we attach to it the conception that some analysis of its different powers is possible, and yet cannot exhibit these powers separately to our consciousness.

Conceptions.

(12.) The logical acts by which the understanding arrives at conceptions are three, —Comparison, Reflection, and Abstraction.

Comparison is that act of the understanding by which several representations are referred to the consciousness simultaneously.

* It is evident from this that distinctness is relative, not positive. And we have dwelt the more upon this, as it does not seem to be very clearly laid down in Kant's Logic.

† If the remarks in the text are founded on truth, it will follow that an increase of knowledge may sometimes render a previously distinct conception indistinct, by destroying the equality between that which we know to be in it, and that of which we are conscious.

Reflection is that act of the understanding by which we determine what is common to several representations, and consequently how we may embrace them in one conception.

Abstraction is that act of the understanding by which we separate all that is not common to several representations.

For example, if I compare several men, I reflect on their resemblance as bipeds that walk erect, and abstract their differences as to height, complexion, &c., and thus arrive at a conception that answers to all of them.

Matter and Sphere of Conceptions.

Conceptions may be considered either as to their matter, or as to their sphere.

(13.) The matter of a conception consists of the various representations contained in it.

The sphere of a conception consists of the things that come under it, or answer its conditions.

As any addition to the matter of a conception is a new condition to be answered, and as a part of the original sphere of the conception probably does not answer this new condition; it follows that the conception thus altered by an addition to its matter will have a less sphere than that of the original conception. Hence it is evident that the sphere and

matter of a conception vary inversely, and that the more matter there is in a conception, the less is its sphere. Let us take an example. The conception of a horse has more matter than the conception of an animal: for the former conception must contain all that is contained in the latter conception, and something more besides. But the sphere of the conception of a horse is less than the sphere of the conception of an animal; as there are many more things that answer the conditions of the latter than the conditions of the former conception.

Rank of Conceptions.

(14.) Superior and inferior conceptions are merely relative terms. The inferior conception contains all the matter of the superior conception, and something more besides, but is itself contained under the superior conception. For example, the conception 'horse' is inferior to that of 'animal.'

A superior conception is also termed a genus, and an inferior conception a species. There can be a highest genus, but there cannot be a lowest species; for we may continue to abstract matter from a conception till we have left so little in it, that the next step would take the conception away entirely. This con-

ception must then be the highest, for it is impossible to think of another superior to it, under which it might rank. But we can never arrive at a lowest species; for though we continue to increase the matter of the conception, and thereby lessen its sphere, we can never be certain that we have exhausted all the possible partial representations, which may make distinct species under this conception, and thus render it a genus: for instance, I may gradually abstract from my conception of 'horse' through the steps of 'quadruped,' 'animal,' and 'organic being,' till at last I arrive at mere being, from which I cannot abstract any thing more. This conception must therefore be considered as a highest genus. But if I take the conception of 'horse,' and continue gradually to increase its contents, I can never be certain that there may not be other unknown distinctions in horses, which might constitute the grounds of a division into still lower species.

But although we can never arrive at a lowest species (which must of course be a conception), we can very easily complete the determination of a cognition by fixing its individuality in Time and Space.

Symbolical expression of the nature of Abstract Conceptions.

(15.) A conception may be symbolically represented as the common measure of the representations from which it is derived. For if we express the various parts of a representation by the letters *a, b, c,* &c., and the whole representation as their product,* we may consider the following quantities as the expressions for three different representations,

$$a\,b\,c\,d\,e\,f,\quad b\,c\,d\,f,\quad a\,b\,c\,d\,e,$$

where it is evident that the conception obtained in the manner already explained, will be symbolically represented by the common measure *b c d.*

It frequently happens that we cannot image to our minds the conceptions we obtain by reflection and abstraction; for sometimes the representations from which we wish to obtain a conception, have not a single sensible partial representation in common, but only a law connecting their parts. And although this law may always be thought, yet it cannot be imaged to the mind, as the image could only

* In the following symbolical exposition of the nature of abstract conceptions, we have thought it better to retain the names for the operations that are suggested by arithmetical algebra. The terms, 'product,' 'multiplication,' &c. must therefore be understood as merely referring to the corresponding symbolical operations.

represent a particular case. If, for instance, I witness a great many cases of the rebound of elastic bodies from a smooth surface, perhaps the only thing these cases have in common is the equality of the angles of incidence and reflection, which cannot be imaged to the mind, but can only be thought. For an image could only give us the representation of the equality of two particular angles, but the conception of the equality generally could only be thought in the understanding. This may be symbolically expressed as follows.

Let the representations be

$$b \,.\, \phi(b), \quad e \,.\, \phi(e), \quad h \,.\, \phi(h).$$

Now, in arithmetical algebra these quantities would have no common measure, but in symbolical algebra we may separate the symbol of affection ϕ, and consider that as the symbolical representation of the conception of the law. And it must be observed, that as a general law may be thought and employed in reasoning, but cannot be imaged (which is only possible for a particular case), in like manner the function ϕ, which is a symbol of affection, may be employed in analysis as a medium of reasoning, but can never be itself interpreted in all its generality in any subordinate science, as its interpretation is only possible by its union with some particular symbol of quantity.

(16.) It is impossible to obtain a correct abstract conception of the organic productions of nature. For let us take as an example the conception of man. If we were to proceed in accordance with the simple method already proposed, and abstract every thing that is not common to all men, we should obtain a conception in which no one could ever recognise the least semblance of humanity: it must possess neither arms, legs, eyes, ears, nose, teeth, hair, or the power of speech,—for men exist who are separately deprived of each of these things. Our abstract conception of the human form divine would therefore contain a trunk without a single limb, and a scull without a single feature.

Again, if we determine in our own minds the greater part of a horse (all but the tail for instance), in conformity with our general conception of that animal, we may allow variations in that one part between very wide limits, and yet consider the whole result as coming under our conception of a horse. In the same manner we might allow any other part of the horse to vary between very wide limits, provided the rest resembled the corresponding parts of horses generally, or of any well made horse in particular: but were we to introduce all these

variations simultaneously, the result would be a monster, to which our conception of 'horse' would be no longer applicable. Hence we see that the several parts of our conception must be considered as functions of other parts, and all mutually dependent on one another. And retaining the symbolical language we have already employed, where u, v, w, &c. express the partial variable representations, we might write

$$\text{abstract conception} = \mathrm{F}(u, v, w, x, y, z)$$

$$\text{where } \phi(u, v, w, x, y, z) = 0;$$

and every set of values that answers the conditions of the equation will correspond to an individual of the species.

(17.) A friend once suggested to the author that there was a great analogy between an abstract conception and an enveloping curve; and after a little consideration he discovered that the symbolical expression for the envelope is not a mere illustration, but a strictly correct representation of the nature of an abstract conception.

Instead of representing each individual of a species by a function of a particular set of values for u, v, w, &c., let us consider the whole locus*

* As the original (*i.e.* geometrical) signification of the word 'locus' is necessarily confined to functions containing not more than three variables, it may be as well to remark, that we have adopted it here in the strictly analogous sense of 'interpretation of an equation.'

of an equation as but one individual. If then this equation contains a constant (a)* to which we give continuously successive values, we shall obtain a family of these equations to individuals whose loci will intersect each other (in a locus of one dimension less than themselves), and the envelope or locus of these intersections will be a correct symbolical representation of the conception abstracted from them all. For we may consider an abstract conception as one which contains all the points of resemblance between any individual, and those immediately preceding and succeeding it.

We therefore discover a perfect analogy between abstract conceptions and enveloping surfaces or curves: and the only difference in their respective symbolical representations consists in the number of variables which we are justified in introducing in either case. For the equations whose interpretations relate to space cannot of course have more variables

* It may be as well to remind the reader, that though the constant (a) is a symbol of quantity in the function considered simply symbolically, yet it becomes a symbol of affection (in fact a part of the function) in the interpretation: the symbol (a) is therefore to be considered as a part of the law between the members of the individual; just in the same manner as a constant in the equation to a surface or curve is only interpreted through its affecting the variables.

than space has dimensions, and are therefore confined to three: whereas the variables introduced in our abstract conceptions concern many other things besides space, and are therefore unlimited in number. We subjoin the symbolical expression for the enveloping or abstract conception.

Let $F(u, v, w, x, y, z, a)$ represent the locus of an individual: then the locus of the enveloping conception will be expressed by the equations

$$F(u, v, w, x, y, z, a) = 0 \quad . \quad . \quad . \quad (1)$$

$$\frac{dF(u, v, w, x, y, z, a)}{da} = 0 \quad . \quad . \quad . \quad (2).$$

And if a is eliminated from (1) and (2) we shall have an equation of the form

$$\phi(u, v, w, x, y, z) = 0,$$

which represents the locus of the abstract conception.

(18.) Before we conclude this section, it may be as well to add a few remarks on the method of thinking certain conceptions purely or independently of sense.

The idea of a limit, which is the basis of the differential calculus, supplies the only possible means of thinking the conceptions Substance and Causality purely, *i. e.* independently of all empirical matter. For in order to think the

conception of Substance at all, I must imagine certain phenomena, and then conceive the objective existence of a substratum for their support. But this alone is insufficient, for although the conception of Substance is obtained, yet it is not pure as long as it contains any sensation or phenomenon. I must, therefore, diminish my sensation till it approximate to zero. This, however, must not be effected by lessening its extension in space, for in that case the object itself would vanish, as its identity and objective existence can only be determined in that form of sensation. Neither, on the other hand, may the sensation be diminished as to its intensity: for although this operation would only affect the conception of its being an object for me, and not of its being an object at all, yet this mode of diminution would introduce the conception of successive states, and therefore other matter besides the bare conception of Substance.

The only way that remains is that of diminishing the time in which the phenomenon is viewed, till we arrive at the limit. If then we consider time as the independent variable, and the phenomenon as a function of it, the pure conception of Substance will be properly represented as the limiting ratio between the phenomenon and the time in which it is viewed.

Let S = the pure conception of Substance, P = phenomenon, and T = time in which the phenomenon is viewed, we shall then have

$$S = \frac{dP}{dT}.$$

And as the conception of Substance contains permanence, it follows that S is constant. We may therefore consider

$$P = S\,T.$$

as the equation to a phenomenon to which the pure conception of Substance alone is applicable.

(19.) Very nearly the same reasoning will apply to the conception of Causality. This can only be imaged to the mind in a succession of phenomena occupying finite portions of time. But while our conception contains sensible phenomena, it is not pure: we therefore diminish the conceived duration of the times in which they exist, till they approximate to zero. When they arrive at this limit the conception becomes pure, for the phenomena will only occupy successive instants of time; and must therefore vanish. Hence we see that the two cases resemble each other, inasmuch as they are each represented by the limiting ratio of the phenomenon to the variable time. They differ however in this: whereas the phenomenon from which the conception

of Substance alone was derived did not vary in time, but bore a constant relation to it; in the latter case the phenomenon will vary, and consequently be some unknown function of time. If then the pure conception of Causality = C, and the other symbols retain their former signification, we shall have

$$P = \phi(T, S),$$

$$\text{and } C = \frac{d\phi(T, S)}{dT}.$$

(20.) If the reader will examine his conception of $\frac{dy}{dx}$ and also of one of these categories, the analogy between them will become immediately evident. The ratio $\frac{dy}{dx}$ cannot be imaged to our minds (because we cannot image the ratio between two nothings), but it can be thought. For we can very well understand that there may be such a relation between two quantities, as that the nearer they approximate to zero, the nearer does their ratio approximate to equality with some given ratio, and that the two approximations are completed simultaneously. Exactly in the same manner the pure conception of Substance cannot be imaged;* for we cannot image that,

* "The invisible was assumed as the supporter of the apparent, *τῶν φαινομένων*—as their substance, a term which in any other interpretation expresses only the striving of the imaginative power under conditions that involve the necessity of its frustration."—*Coleridge's Friend.*

which, considered as to space and time, and the sensation contained in them, is equal to zero. But it may be thought: for we can very well understand that there should be in our minds a law or *à priori* relation between phenomena and the time in which they are viewed, and that this law should retain its signification even when the phenomena and their time both = 0. It is, however, quite beyond the powers of symbolical representation to give the nature of these conceptions themselves. Nothing more is here intended, than to express, by an analogy to the mathematical idea of a limit, the only method by which these conceptions can be thought pure, and independent of the possible experience to which they are necessary.

SECTION III.

JUDGMENTS.

(21.) A judgment is that act of the understanding by which it determines how certain representations may be conjoined in the consciousness according to some rule of its own.

Kant has divided the consideration of judgments as to their form into the four points of Quantity, Quality, Relation, and Modality; and each of these again into three subdivisions or moments,* from which he derives the twelve categories, or pure conceptions of the understanding.

Quantity.

(22.) The three moments of Quantity are the Universal, the Particular, and the Singular. These determine the quantity of the subject of a judgment, and refer respectively to the whole sphere of a conception, to a part of the sphere

* Our choice of the word 'moment,' was entirely determined by its having been employed in this signification by the anonymous Translator of the Criticism.

of a conception, or to an individual; *e. g.* All men are mortal; some men are mortal; John is mortal.

In Transcendental Logic we distinguish between the Universal and Singular, because the subject of the former is in respect of its formal quantity unlimited, whereas the subject of the latter is completely determined. If, for instance, I speak of 'all men,' there is nothing in my bare conception of man which can put any limit to the number of individuals that may come under it, or answer its conditions; and the quantum of the sphere of the conception is therefore formally indeterminate: whereas, if I speak of an individual, John, my cognition contains all that is found in the conception of man, and also the possibility of his complete determination in space and time, for on that his identity depends.* But For-

* That our conception of identity requires us to think the possibility of determining the object in a particular space at a particular time, is evident from the consideration that there is no limit to the number of individuals who may exactly resemble each other in all other respects. Now the particularity of space and time is determined by a reference to ourselves; for we can only think of a particular time as being at such a period before or after the present time, or that in which we are thinking, and of a particular space as being at a certain distance from the present space, or that in which we are now sensible: hence, the identity of all external objects ultimately depends on a reference to the identity of the thinking subject. But if I endeavour to represent my own identity, I must have recourse to the identity of external objects;

mal Logic takes no cognizance of the object thought, and consequently does not recognise the distinction: for in speaking of an individual man, I speak of all that answers to my cognition, and that is all that Formal Logic can require for an Universal. This science therefore acknowledges only the two moments, Universal and Particular.

Quality.

(23.) The three moments of Quality are—the Affirmative, the Negative, and the Indefinite.

The first, as its name implies, affirms the predicate of the subject; the second denies it; but the third affects the matter of a conception which it limits by entirely excluding it from some particular conception. Thus, 'not A' is indefinite, as it applies to any thing that lies out of the sphere of A. As every thing

e. g. I may represent myself to myself as the person who was in a particular room at a certain time: hence it follows, that I think of the identity of other objects by means of a reference to myself, and of myself by means of a reference to other objects. There is, then, between the 'me' and the 'not me' a kind of polarity, which existing in space and time according to some undiscoverable law of the consciousness, gives rise to the conception of identity. This may be illustrated by representing space and time as the axes of co-ordinates, and our own mind as the origin from whence any values of x and y may be measured for the determination of an object. Or if we think of our own identity by means of that of another object, we must place the origin at the object, and consider our own mind as the point to be determined.

must be either A or 'not A,' it is the same thing whether 'not A' be affirmed or A be denied of any subject; and for this reason the Indefinite is not considered in Formal Logic, as the Negative moment can always take its place.

Relation.

(24.) The three moments of Relation are—the Categorical, the Hypothetical, and the Disjunctive.

The first of these considers the relation of cognitions to the same substratum or substance. The second considers the dependence of one cognition as consequent upon another as antecedent. The third considers a reciprocity of relation between cognitions in such a manner that any one of them can be known by the determination of all the rest. The most general form of a Categorical judgment would be 'A is B,' or 'No A is B,' in which the conception B is asserted to belong, or not to belong, to the subject A. An Hypothetical is of the form 'If A is B, C is D,' in which the judgment that 'C is D' is made to depend as consequence upon the judgment that 'A is B' as antecedent. Either 'A is B, or 'C is D,' is a Disjunctive judgment, and the determination of either part would determine the other.

On these three points of a judgment we touch but lightly here, because they affect the laws of Formal Logic, and are therefore more fully considered in another place.

Modality.

(25). Modality concerns the manner in which we think a judgment with regard to its truth, and is divided into the three moments of Problematical, Assertive, and Necessary. The first degree of holding true is that of problematical, which merely signifies the possibility of the judgment, inasmuch as it does not violate any of the universal laws of thinking.

The second degree accords to a judgment the agreement with the matter of the senses, as well as with their necessary forms. The third degree makes some *à priori* law of thinking the matter of the judgment.

A problematical judgment merely implies a formal, but not a material possibility. For instance, the conception of an elderly lady riding through the air on a broomstick, is formally possible, as it involves no contradiction, but is not generally considered materially possible.

A judgment may be assertive without its contents having come immediately under the

cognizance of the person who forms it. Nothing more is meant by the above definition, than that assertive judgments must have sufficient and empirical grounds for their truth.

The third moment, Necessity, is applicable to any *à priori* law, whether rational, intellectual, or intuitive. For instance, that A is C, if A is B, and B is C, is a necessary truth of reason. That no change in phenomena can be self-originated, or that every effect must have its cause, is a necessary truth of the understanding. That the straight line is the shortest between two given points, is a necessary truth of intuition.

(26.) Propositions are judgments whose modality is either assertive or necessary: for a problematical judgment, so far as its modality alone is concerned,* merely implies that a certain judgment is not necessarily false, but bears no positive testimony to its truth. And we could not therefore say with propriety that any thing is *proposed* in a problematical judg-

* It was necessary to introduce this restrictive clause; for problematical judgments, considered independently of their modality, are generally intended to imply some anticipation of a truth, and their main use is as a step to the assertive. For instance, there may be such a person as Mr. Stiggins in New York, but no man would ever make such a judgment unless he had some grounds for believing it true.

ment, as that term has evidently a positive signification.

Propositions alone can enter into the consideration of Formal Logic; for the laws of Reason require something determinate for the matter of the judgments whose combinations they regulate, and are not conversant about mere possibilities which have only a negative value in relation to truth. This science moreover regards all propositions as assertive: for it cannot admit the distinction between assertive and necessary modality, as this is determined by the matter of judgments, and is quite independent of their form.

Synthetical and Analytical Judgments.

(27.) Judgments may be divided, as to their matter, into Synthetical and Analytical.

Synthetical judgments are those whose predicates are not contained in the conception of their subjects.

Analytical judgments, on the other hand, predicate of their subjects something that is already contained in them, or, in other words, their predicate is a superior conception to their subject.

Hence we see that synthesis, or the principle of synthetical judgments is the conjunction of

two different cognitions, neither of which is contained in the other.

Analysis, or the principle of analytical judgments, is the dissection of a conception into its partial representations.

As the matter contained in the conceptions of the subject and predicate determine the nature of the judgment in respect of the above division, it follows that the same proposition may express an analytical judgment to one person, and a synthetical judgment to another. The proposition 'all members of the University are members of some particular college,' is an analytical judgment to a person who is well acquainted with the constitution of the University, and whose conception of a member of the University already contains the conception of his belonging to some particular college. But the same proposition is synthetical to a person who is entirely ignorant of that constitution, and is therefore unacquainted with the necessary conditions to being a member of the University.

(28.) But the most remarkable instance of confusion between synthesis and analysis arises from the circumstance, that what is analysis considered objectively, is very frequently a synthesis if considered subjectively. Thus the process by which a chemist examines any

substance for the purpose of discovering its qualities, is rightly named analysis when referred to the object examined, but is synthesis when considered in relation to himself. For instance, if a person, who is perfectly ignorant of the constituent elements of water, separates the two gases by means of some chemical process, the investigation is correctly styled analysis, if considered in reference to the object 'water,' as he has disjoined its component parts: but the result in the operator's own mind is a synthesis; for his previous conception of water contained nothing more than fluidity, the absence of all colour and taste, and perhaps the property of dissolving a great many salts. But by the analysis of the object he has increased this conception, by adding to it, that water is composed of oxygen and hydrogen; and consequently his mental act is a synthesis.

Definition.

(29.) Definition is a judgment which determines all the partial representations contained in any conception, and is therefore equivalent to a completed analysis.

There is a specious resemblance of definition which is grounded on a synthesis, and has really no right to the name.

Definition, in the strict acceptation of the word, regards only the matter of a conception, and not its sphere. But sometimes the term is improperly applied to the exposition of any conception whose sphere is the same with that of the conception to be defined. Let us suppose that a conception *a b*, or one which contains the partial representations *a* and *b*, is connected by a certain law with the conception *c d*, and in such a manner that the sphere of *a b* is identical with the sphere of *c d*. In this case it would not be a correct definition of the conception *a b*, to state that it contained the partial representations *c* and *d*; though such a judgment would lead us to the same individuals as if the correct definition had been given. Such a judgment would be a true synthetical judgment, but not a definition.

(30.) It follows from this, that two persons may give different definitions of the same thing, and yet both of them be equally correct: for though the things be the same in each case, yet the conceptions by which each individual may recognise these things may be very different, and perhaps have hardly a single point in common. Let us take as an example the conception of water. The common conception contains little more than that water

is a perfectly tasteless and colourless liquid. Now these properties are connected by a law of nature with a combination of oxygen and hydrogen, in certain proportions and under certain circumstances; and a definition which contained either account of water would equally refer to the same thing, but to very different conceptions. The rustic would probably not have much faith in the chemist's proof that a certain liquid was water by his exhibiting the gases in a separate state; neither would the chemist have much faith in the rustic's definition: and yet the definition would be correct in each case, as it would express that conception by which each was in the habit of recognising the thing itself. The example in Mr. Newman's Logic is a very good one. He observes that it would be extremely incorrect to define man as a cooking animal, although it is highly probable that man, and man only, answers to that description. But as we do not recognise men by this peculiarity in their nature—in short, as it does not form part of our conception of humanity, such a definition would only mark out the sphere, and by no means determine the matter of our conception of man. When two conceptions are united by some law which is immediately and universally recognised, it becomes a matter of indif-

ference from which of these conceptions we derive our definition. For instance, the common definition of a triangle is 'a figure of three sides,' whereas in strictness it should be 'a figure of three angles.' The usual definition is in reality a pure synthetical judgment of intuition.

FORMAL LOGIC.

BOOK I.

SECTION I.

PROPOSITIONS.

(30.) Propositions are of three kinds—Categorical, Hypothetical, and Disjunctive.

Form of Categorical Propositions.

Categorical propositions consist of two terms and a copula, of which the terms designate the matter, and the copula their relation to each other. Their most general form may be represented by the proposition 'A is B,' in which the terms A and B are connected by the copula 'is.' Particular examples are, 'horses are animals,' 'men are not monkies.'

Many categorical propositions do not come immediately under this simple form, but are easily reduced to it by a periphrasis; *e. g.* the proposition 'I took a ride this morning'

may be put under the form, 'I am a person who took a ride this morning.'

The terms are susceptible of no other* formal variations than the moments of quantity, which determine to how much of the sphere of a conception the proposition refers.

There can be only two such formal variations—the whole, and less than the whole, or part. For we evidently cannot speak of more than the whole, as the idea involves an absurdity: neither can we make any distinction between different quantities that are less than the whole, without introducing the consideration of the matter of a conception as well as of its form. It follows, therefore, that 'the whole' and 'less than the whole' are the only variations of quantity which Formal Logic can recognise: *e. g.* we may speak of 'all albinos,' *i. e.* the whole sphere of the conception 'albino,'

* It is sometimes convenient to consider the matter of a proposition with respect to its quality as well as quantity, and to speak of 'not A,' 'not B,' &c.: in this case, the 'not A' is called the external sphere of A. The attribute of quality is, however, but rarely accorded to the terms: for if the predicate is an external sphere, the form of the proposition is precisely the same as if the negation had been applied to the copula. Thus, A is a 'not B' is exactly equivalent to A 'is not' B. And an external sphere is but rarely introduced in the subject for other reasons, as well as on account of its extreme awkwardness. For instance, we do not say, 'not men' are 'not Englishmen,' but 'all Englishmen are men,' though the meaning of the two propositions is precisely the same.

or of 'some albinos,' *i. e.* a part of the sphere of that conception.

When the whole of either term is compared with the other, it is said to be distributed; when a part only is so compared, it is said to be undistributed. For instance, in the proposition 'All A is B,' the term A is distributed; but in the proposition 'Some A is B,' it is undistributed.

The only formal variations of which the copula is susceptible, are two moments of quality, affirmation, and negation. For if we compare any two terms A and B in a categorical proposition, we can only affirm or deny the one of the other: *e. g.* A is B, A is not B. In the first example the quality is said to be affirmative, in the latter negative.

Hence, the two terms and the copula, which constitute the three elements of a categorical proposition, severally admit of two gradations or variations in form: and if there were no law for their limitation, the number of possible combinations of these elements would $= 2^3 = 8$. These eight combinations would be,

* All A is Some B.	All A is All B.
* Some A is Some B.	Some A is All B.
* All A is not All B.	All A is not Some B.
* Some A is not All B.	Some A is not Some B.

(32.) But we find by experience, that of these eight forms of categorical propositions, only four are ever introduced in practice: for the quantity of the term that is placed last in the general categorical form (*i.e.* A is B) is entirely determined by the quality of the copula.* The variations of the copula and of this latter term must therefore be taken together, and the whole number of combinations for categorical propositions will $= 2^2 = 4$.

As the first and last† terms of a categorical proposition do not bear precisely the same relation to the copula, independently of their mere position, they are distinguished respectively by the names of *subject* and *predicate:*

* The law for the dependence of the quantity of the predicate upon the quality of the copula, can only be assumed in Formal Logic: for the *à priori* grounds upon which it rests are to be found in the consideration of one of the categories or conceptions of the understanding, and therefore belong to the Transcendental branch of the science. This subject will be considered in a future section, but a cursory view of it may not be wholly out of place here. The category of substance can never be introduced in the predicate of any proposition, and this term must therefore be a conception. But the quantum of the sphere of a conception is entirely indeterminate, as there is no formal limit to the number of individuals that may answer its conditions. It is therefore impossible to compare the limits of the sphere of the predicate with those of the subject, as those of the former are unknown. The subject then can only be placed wholly out of, or wholly in, the sphere of the predicate, and the latter will be distributed or undistributed accordingly.

† *i.e.* the first and last in the simplest form of a categorical proposition, *e.g.* 'All A is B.'

and the propriety of introducing such a distinction into Formal Logic depends entirely on this formal difference of relation, and not at all on the real nature of the distinction, which is a subject of Transcendental Logic, and cannot therefore be considered here. Neither does it at all depend on the order in which the terms are arranged; * for this is frequently reversed in some languages, and occasionally even in English.

Of the eight combinations given in the last page, those marked by an asterisk are the four legitimate Categorical propositions. As, however, the quantity of the predicate is a known function of the quality of the copula, it is never expressed, but always understood; the four propositions will therefore assume the following form:

All A is B.	No A is B.
Some A is B.	Some A is not B;

where it must be observed that the proposition 'No A is B' is equivalent to the proposition

* This order is seldom introduced in English, except in poetry, emphatic diction, or where the subject is a sentence. The following are examples of these three cases:

"Oh, many are the Poets that are sown
By Nature!—*Wordsworth.*

i. e. the poets are many that, &c. "Brave indeed is that man who," &c. *i. e.* that man who, &c. is brave indeed. "It is very easy to say a great deal in a letter that cannot be hinted at in a personal interview," *i. e.* to say a great deal in a letter, &c. is very easy.

'All A is not B,' or the entire exclusion of A from B.

As the difference in form of these four propositions arises from variations in the subject and copula, they will admit of two corresponding co-divisions. One of these is into Universal and Particular, and respects the quantity of the subject; the other is into Affirmative and Negative, and respects the quantity of the copula. They are thus divided into Universal Affirmative represented by A; Universal Negative by E; Particular Affirmative by I; and Particular Negative by O:

	AFFIRMATIVE.	NEGATIVE.
Universal.	A. All A is B.	E. No A is B.
Particular.	I. Some A is B.	O. Some A is not B.

(33.) The law by which the number of legitimate combinations is reduced to four, may be stated as follows:

Affirmative copulas have undistributed predicates; Negative copulas have distributed predicates. For if B is predicated of A, A is subsumed under the conception B as being a part of its sphere; for instance, in the pro-

position 'all horses are animals:' the subject 'horses' is subsumed under the conception of the predicate 'animals,' as being a part of the sphere of that conception. But it is evident that the proposition does not refer to the whole sphere of the conception 'animals,' for in that case there could be no other animals than horses.

The annexed diagram is a general illustration of the law:

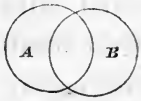
All A is B. Some A is B.

In each of these diagrams we see that A is compared with only a part of B; that is to say, B is undistributed.

It frequently happens that the sphere of the predicate is not any larger than the sphere of the subject: this however is incidental, and can only arise from the peculiar nature of the matter of the proposition, and never from its logical form: for in the example 'all carnivorous animals have teeth of a certain form,' it may be equally true that 'all animals with teeth of this form are carnivorous.' But the latter proposition requires additional knowledge of the subject matter, and cannot be deduced from the mere form of the original statement.

If, on the other hand, the predicate B is denied of the subject A, the sphere of A is entirely excluded from the whole sphere of B: for instance, in the proposition 'no durable friendship can be based on a participation in crime,' friendship is entirely excluded from all those things which can be based on a participation in crime: or in the particular proposition 'some of the most talented men do not possess the best private characters; these 'some men' are entirely excluded from all who possess the best private characters. In each case then the predicate is distributed, as the proposition refers to the whole of its sphere. The diagrams will take the following forms:

No A is B



Some A is not B

in which it is evident that the whole of B lies out of as much of A as is introduced in the subject.

The accompanying table contains the results of these remarks:

		SUBJECTS.	PREDICATES.
Universal Affirmative	A ...	Distributed	— Undistributed.
Particular Affirmative	I ...	Undistributed	— Undistributed.
Universal Negative	E ...	Distributed	— Distributed.
Particular Negative	O ...	Undistributed	— Distributed.

SECTION II.

MUTUAL RELATIONS OF CATEGORICAL PROPOSITIONS.

(34.) The mutual relations of the four propositions A, E, I, O, have been usually classed by logicians under the generic term of Opposition. But as there is no opposition whatever in some of these relations, it may be more correct to restrict the acceptation of the word to those cases which contain its meaning, and apply that of Subalternation to the rest.

Opposition.

Opposition is of three kinds—Contradictory, Contrary, and Sub-contrary.

Contradictory opposition is the relation which exists between two propositions that simply contradict each other. One of them therefore must be false, and the other true. For each of them must be either true or false, and if one of them is true, the other which asserts that it is false, must be itself false; and if one of them is false, the other which asserts that it is false, must be itself true.

Contradictories differ from each other in the quality of their copulas; for as one denies

what the other asserts, the former must be affirmative, and the latter negative.

They differ also in the quantity of their subjects. For a contradictory contains nothing more than the falsity of that proposition to which it is opposed, and must therefore express the change that takes place in the relation of the terms, when its opposite first ceases to be true. But the first formal change affecting the truth of an universal proposition, affects only a part of its subject; as that cannot be true of the whole, which is false of a part. And the first formal change affecting the truth of a particular proposition, must necessarily affect the whole of the subject; as that cannot be false of every part, which is not at the same time false of the whole.

These remarks will be better understood by the assistance of the accompanying diagrams:

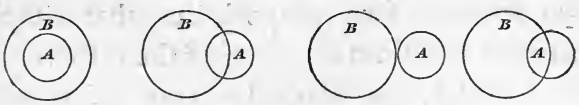


Fig. 1. *a.* Fig. 1. *b.* Fig. 2. *a.* Fig. 2. *b.*

Fig. 1. *a,* represents the proposition, All A is B; and Fig. 2. *a,* represents the proposition, No A is B. Now it is very evident that the first changes which will render these propositions no longer true, must take place when the sphere of A first begins to emerge from

that of B, as in Fig. 1. *b*, or when it first begins to impinge on it, as in Fig. 2. *b*. And the propositions which express these changes must necessarily be the respective contradictories of the original propositions. 'Some A is not B' will therefore contradict the proposition 'All A is B,' and 'Some A is B,' the proposition 'No A is B.' Contradictories are therefore opposed to each other both in quality and quantity: the universal affirmative A is opposed to the particular negative O; and the universal negative E, to the particular affirmative I. Example: 'Some Englishmen are as light-hearted as Frenchmen;' 'No Englishmen are as light-hearted as Frenchmen.'

(35.) Contrary opposition exists between two propositions which contain each other's contradictory, and something more besides. Hence it follows that they cannot be both true, but may be both false: for if one is false, that part of its contrary which merely contradicts it, must be itself true; but the other part, or surplus statement, may be either true or false.

As contraries state more than each other's contradictories, the quantity of their subjects must be greater, and therefore distributed; whence it follows that A and E are the only propositions between which this species of opposition exists. Examples of this opposition are—'All smuggling is dishonest'; 'No

smuggling is dishonest.' 'All Englishmen are haughty'; 'No Englishmen are haughty,' &c.

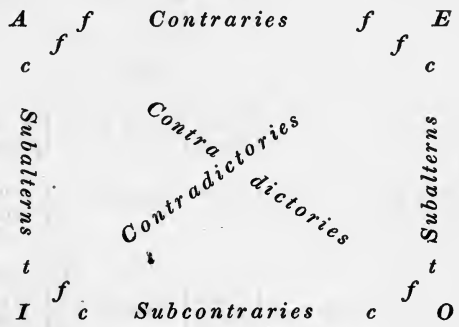
(36.) Subcontrary opposition, as its name in some measure indicates, is the opposition of propositions contained under contraries. The subjects of the subcontraries must of course be less than the subjects of the contraries which contain them, and are therefore undistributed. As I and O the sub-contraries are contradictories of the two contraries E and A, and as the contraries cannot be both true, but may be both false, it follows that the subcontraries may be both true, but cannot be both false. Examples are, 'Some men are liars'; 'Some men are not liars': both of which are true. 'Some men are perfect'; 'Some men are not perfect': of which propositions one is false.

Subalternation.

(37.) Subalternation is the relation which exists between an universal proposition, and the particular that is contained in it. The former is usually called the Subalternant, the latter the Subalternate.

The truth of the subalternant necessarily involves the truth of its subalternate, as what is true of the whole, must be also true of a part; and the falsity of the subalternate involves the falsity of the subalternant, as what

is false of a part cannot be true of the whole. But the converse of these propositions does not hold; for what is true of a part, is not necessarily true of the whole, and what is false of the whole, is not necessarily false of a part. Hence, we cannot infer the truth of the universal from that of the particular subalternate to it, nor the falsity of the particular from that of its subalternant universal. Examples are—'All dogs are animals,' whence it follows, 'Some dogs are animals.' 'Some politicians are no better than they should be,' whence it cannot be logically inferred that 'All politicians are no better than they should be.' The annexed scheme is usually employed to elucidate the relations of categorical propositions:—



f means false; *t* means true; and *c* contingent.

The letters *f*, *f*, *c*, that are placed against the Universal Affirmative A, are intended to

represent that A is false when E or O are true, and contingent when I is true, and similarly of the rest of the table.

Perhaps the following table is more immediately intelligible —

			If one is	The other is
Opposition.	Contradictions.	Between A and O.	True	False.
			False	True.
		Between E and I..	True	False.
			False	True.
	Contrary.	Between A and E.	True	False.
			False	Contingent.
	Subcontrary.	Between I and O.	False	True.
			True	Contingent.

Subalternation.	Between A & I.	If A is	True / False	Then I is...	True.	
					Contingent.	
		If I is	True / False	Then A is..	Contingent.	
					False.	
	Between E & O.	If E is	True / False	Then O is..	True.	
					Contingent.	
		If O is	True / False	Then E is..	Contingent.	
					False.	

Conversion.

(38.) Conversion is the transposition of the terms of a proposition, in such a manner that the subject becomes the predicate, and the predicate the subject. Conversion is of two kinds, simple and limited. The former is the simple transposition of the terms, retaining the previous quantities; the latter requires the limitation of the subject.

In all conversion, no term must be distributed in the converted proposition, that is not distributed in the original proposition: hence E and I are simply convertible, as in E both terms are distributed, and in I, neither. No term then is distributed in the converted proposition, that was not previously distributed in the original proposition. But A is not simply convertible, as its predicate is undistributed, and would become distributed by simple conversion. It admits however of limited conversion, and then becomes I; for in I, no terms are distributed, and therefore none can be distributed in it, which are undistributed in the original proposition. E may also be converted by limitation, as well as simply, and then becomes O. O can never be converted, as its subject is undistributed, and therefore can never become the predicate of

a negative proposition, which is always distributed.

CONVERSION.

Simple.	Limited.
E..... to .. ...E	A..... to I
I... ... to I	E..... to .....O

Examples :—

No cats are cows.	All dogs are animals.
No cows are cats.	Some animals are dogs.

SECTION III.

HYPOTHETICAL AND DISJUNCTIVE PROPOSITIONS.

(39.) An hypothetical proposition consists of two judgments and a copula.

The judgments constitute the matter of the proposition, and the copula expresses their relation, or that function of the understanding by which they are conjoined in one consciousness.

The whole proposition represents that one of these judgments which is called the antecedent, contains all the necessary grounds for the truth of the other, which is accordingly called the consequent.

The most general form of these propositions is the following. 'If A is B, C is D,' in which the judgment 'A is B' is the antecedent, 'C is D' the consequent, and the word 'if' the copula.

(40.) As an hypothetical proposition merely asserts such a connexion between two judgments, that the truth of the one may always

be inferred from the truth of the other,* it follows that both the form and the matter of these judgments constitute the matter alone of the hypothetical, and cannot be the means of introducing any variations into its form. Neither can such variations arise from the form of the copula; for the conception of a law connecting a consequent with its grounds, may be thought, or not thought, with regard to any judgments, but will neither admit of a negative quality, or of a quantum or degree. Hence there is but one form for hypothetical propositions, and all the variations that take place in them must be considered as affecting their matter alone. For instance, the proposition 'if some A is B, some C is D,' does not differ in form from the proposition 'if all A is B, all C is D.' It is true that the categorical judgments in these examples have formal differences, as in the former they are both particular, and in the latter both universal. But in either case, such a relation is asserted to exist between them, that the truth of the one must be the invariable consequence

* The understanding merely asserts a relation of such a nature between the judgments that the truth of the one *may* be inferred from that of the other. But in order that this result should be *actually* inferred, another judgment is necessary which shall assert the truth of the antecedent, and then the *reason* will deduce the truth of the consequent.

of the truth of the other; and it is this universality alone, and not that of the judgments themselves, with which the form of an hypothetical proposition is concerned.

(41.) From these observations it will readily be seen that an hypothetical proposition cannot have an hypothetical contradictory: for a contradictory states nothing more than the falsity of that proposition to which it is opposed, and, if this latter is an hypothetical, merely denies that there is any law by which the truth of the consequent can be rightly inferred from that of the antecedent. But this does not establish any similar relation between any other two judgments, and is not therefore hypothetical in its nature. The contradictory must accordingly be a categorical proposition, in which I predicate of my consciousness, that it does not give objective validity to such a relation between two judgments, that one contains the grounds for the other.

(42.) Many logicians have considered the hypothetical proposition as merely another form of a categorical; and this error has been rather favoured by the seeming ease with which an hypothetical may be put under such a categorical form as shall answer all the logical ends of the original proposition. But the two propositions have been shewn by

Kant to be based on fundamentally different acts of the understanding, which ought never to be confounded with each other. For instance, the hypothetical proposition 'if A is, B is,' appears to be fully expressed in the categorical form, 'all the cases of A being, are cases of B being;' and so far as any logical deductions from either one or the other are concerned, the propositions are equivalent. But there is this fundamental difference between them: the former represents the dependence of one judgment upon grounds contained in the other, and therefore enunciates a law to which the understanding has accorded its assent as being universally valid; whereas the latter form either merely asserts the fact 'that all the cases of A being are cases of B being,' without superadding the conception that they are so universally by a law; or else, if it means that 'all possible cases of A being are necessarily cases of B being,' it has only placed what constituted the form in the hypothetical proposition in the matter of the categorical, but has by no means transfused the virtue of the form of the one into the form of the other. In fact, this method is no more a formal reduction of an hypothetical to a categorical proposition, than if we merely said, "the hypothetical proposition 'if A is, B is,' is true."

Disjunctive Propositions.

(43.) Disjunctive propositions consist of any number of judgments, which they disjoin in the relation of reciprocal dependence. Hence the whole conception of their possibility is divided between them, and the truth of either may be inferred from the falsity of the others, or inversely, the falsity of all the others from the truth of one. Their general form is 'either A is B, or C is D.' All the observations that have been made on hypothetical propositions, in order to prove the impossibility of any variations in their form, apply with equal force to the disjunctive: and as the disjunctive expresses a distinct function of thinking, any attempt to bring it into a categorical form will meet with no better success than in the case of hypotheticals. It is true that we can express the meaning of a disjunctive in a categorical form; but then, what constitutes the form in the one proposition must be introduced in the matter of the other. For instance, the disjunctive proposition 'A is either B or C' may be expressed thus: 'the cases of A being B are identical with the cases of A being not C.' But here we see that the completeness of the division, which is the real principle of disjunctive propositions, is expressed in the conception of the identity of

one judgment with the negation of another, which constitutes the matter of the categorical proposition. And hence, as in the case of the hypothetical, we have no more succeeded in the transformation of the disjunctive to the categorical form than, if we had said, "the proposition 'A is either B or C' is true."

(44.) Disjunctives resemble hypothetical propositions in not admitting a contradictory of the same form with themselves: for the contradictory of a disjunctive must merely contain the falsity of that proposition, and therefore denies that a certain cognition is exactly divided out among the members of the disjunction, but by no means gives a new and correct division. Hence the contradictories to both these forms of propositions are simply categorical in their nature.

SECTION IV.

SYLLOGISM.

(45.) Kant has defined syllogism as that function of thinking by which we derive one judgment from another, and has in this manner included all those judgments which may be formally derived from another single judgment by the methods of opposition, subalternation, &c.

These syllogisms, styled *immediate* from their wanting a middle term, he arranges under the title of syllogisms of the understanding, and the propriety of such a classification, as far as the meaning alone is concerned, is evident from the nature of the faculty employed. But as it is rather questionable whether the derivation of the word will bear out this general acceptation, we shall follow the usual practice of logicians, and restrict its signification to those syllogisms which Kant defines as the syllogisms of reason.

Syllogism, then, is that function of the reason by which a third judgment is derived

from the union of two others, neither of which contain it when taken separately.

(46.) The first division of which syllogism is susceptible, is determined by the nature of the judgments in respect of their moments of relation. These have already been shewn to be three—the categorical, hypothetical, and disjunctive; and as there are a great many combinations of judgments of these several moments, from all of which other judgments may be deduced, it follows that there must also be a great many different syllogistic forms of ratiocination. But as the principles involved in all of them are the same as those in the three simplest forms (which are usually named after the three moments), it will be sufficient to investigate the laws which regulate these alone, and, with one or two exceptions, leave the consideration of the rest to the ingenuity of the reader. In these three species of syllogism, the categorical, the hypothetical, and the disjunctive, a categorical conclusion is deduced from one judgment of categorical form, and another of that form from which the syllogism takes its name. We shall now proceed to the separate consideration of each of these three forms of reasoning.

Categorical Syllogism.

(47.) In this syllogism the two given judgments, which are also called premises, and the derived judgment or conclusion, are all categorical propositions. The nature of this species of argument may be popularly stated as follows: 'If two cognitions are severally compared with a third cognition, (that is, objectively the same in each case,*) they may afterwards be compared† with one another.‡

* Perhaps an objection may be brought against this exposition, on the grounds of its admitting negative premises. But it must be observed that when both premises are of this quality, the real middle is an external sphere, and consequently undistributed, or virtually two middles. And this fallacy is quite excluded by the clause in parentheses.

† The affirming or denying one cognition of another is what is here intended by comparison. For if two cognitions are referred to the consciousness simultaneously, they must either be thought as belonging to the same subject or substratum, in which case one may be affirmed of the other; or as not belonging to the same, in which case one may be denied of the other.

‡ As it is our present object to discover the universal laws of all categorical syllogism, we have preferred this simple though not very elegant definition to the celebrated '*dictum de omni aut nullo*' of Aristotle, which is merely a particular case of it, and may be stated thus: 'What is affirmed or denied of all, is affirmed or denied of each;' but this would only have given a particular class of categorical syllogisms, and is therefore insufficient for our present purpose. Were we however to admit either the empirical considerations of the use of the reason, or the metaphysical considerations of the conceptions of the understanding, we should then be justified in confining our attention to the dictum alone. For in the actual use of the reason we discover the fact, that this form of syllogistic ratiocination is at once more natural

This is the principle of all categorical syllogism; and whenever the conditions are really answered, and the comparison made according to certain laws which we are about to determine, the conclusion is necessary, and the reasoning incontrovertible. Let us take as an example, 'Animals of the same species are supposed to have originated from the same pair; all dogs are animals of the same species, therefore all dogs are supposed to have originated from the same pair.' Here, dogs and animals supposed to have originated from the same pair, are severally compared with animals of the same species, and are afterwards compared with one another.

(48.) We must now determine those laws, in conformity with which the various forms of categorical propositions may be so combined as to answer the required conditions of syllogism.

For this purpose we must not give a mere aggregate of rules, even though those rules should be in themselves sufficient. This method, which has been adopted in most (if not

and intelligible than the rest, and in the nature of one of the conceptions of the understanding, we can discover the reason of the fact. But we must not regard what lies out of the field of Formal Logic, and have therefore given a definition which will include all the forms of categorical syllogism that are possible in theory, however awkward some of them may be in practice.

all) works on Logic, is exceedingly unscientific, as it only shews that certain rules are requisite and sufficient to provide against certain forms of paralogism, but by no means proves that these are the only forms to which a syllogism is exposed. Now the method of exhaustion will secure our reasoning against all fallacy, so far at least as mere Formal Logic is concerned.* We shall therefore dissect categorical syllogism into its ultimate elements, and discover what rules are necessary and sufficient for the prevention of fallacy in each of them.

(49.) Every categorical syllogism contains three terms—the major term, the minor term, and the middle term; and three propositions—the major premiss, the minor premiss, and the conclusion. In the major premiss, the major term is compared with the middle term. In

* It may be as well to notice here, the very prevalent custom of introducing into treatises on Logic, the consideration of material as well as formal fallacies. In all the works on this science that have come under our observation, (with the exception at least of Kant's,) nearly the first rule for syllogism is to the effect that the middle term must not have different meanings in the two premises. Now Logic merely considers the formal laws of reasoning, but has nothing whatever to do with its matter; and the introduction of such a rule as this in a work on that science, is something like beginning a treatise on Geometry with an injunction to the student to draw his circles correctly: as if mathematical reasoning could be at all affected by the perfection of the diagram.

the minor premiss, the minor term is compared with the middle term. And in the conclusion, the major and minor are compared together. The major term is always the predicate, and the minor the subject of the conclusion. Hence may be deduced the following rules for distinguishing the different terms and premises in any given syllogism :—

1st. The term that is common to the two premises is the middle term.

2nd. The term that is the predicate of the conclusion is the major term; and the premiss that contains it, the major premiss.

3rd. The term that is the subject of the conclusion is the minor term; and the premiss that contains it, the minor premiss.

The three propositions are usually placed in the following order: the major premiss, the minor premiss, and the conclusion. And the particular form of a syllogism, as far as it depends on the particular categorical forms of its three propositions, is termed its mood: though this name is also given to any ternary combination of the symbols A, E, I, O, without reference to its conformity to the syllogistic laws.

(50.) For the simplification of the subject

we shall divide it into the three following questions:—

1st. What forms of premiss are sufficient for a conclusion of the reason,* without considering its capability of being expressed in any of the four categorical forms, (*i.e.* A, E, I, O)?

2nd. When can the conclusion be expressed in any of the legitimate forms, and when can it not?

3rd. What laws are sufficient and necessary to secure the legitimacy of the conclusion?

As the first of these questions excludes all reference to the categorical form of the conclusion, and only seeks for premises that give a conclusion valid for the reason, it does away with the distinction of subject and predicate, so far as the conclusion is concerned; and therefore with the distinction of major and minor premiss. Hence, in this part of our investigation, both premises are on exactly the same footing.

* As it is impossible that the reader should understand the following pages, unless he has a clear conception of what is meant by a conclusion 'possible for the reason, but not expressible in any of the four legitimate categorical forms,' we subjoin the following example. If the premises are 'some B is A, some C is not B,' the reason may logically deduce that some C is not some A. But this conclusion is not in one of the four legitimate forms, and is therefore styled a conclusion only for the reason.

We may also discard all considerations of the extremes. For any peculiarities in the form of these terms, can merely require corresponding peculiarities when they recur in the conclusion, as they constitute the matter only of that judgment. They may therefore affect the nature of the conclusion, but cannot affect the possibility of its existence.

All that remains then for our consideration, is the middle term, and the copula in both the premises.

(51.) Now the middle term admits of no variations but those of quantity. Every law therefore regarding it must respect this, and this alone. And we find accordingly that the middle term must be distributed in at least one of the premises.

For if the middle term is undistributed, a part of it only is compared with each premiss. And as it cannot be formally known that the major and minor are compared with the same parts, the middle term becomes virtually two terms, and the major and minor terms cannot be considered as formally compared with the same. But it is not necessary that the middle term should be distributed in more than one premiss. For if the whole middle term is compared with one of the extremes in one premiss, and only a part of it

with the other extreme in the other premiss, that part must be compared with both extremes, and in this case therefore the middle term cannot be considered as two terms, or ambiguous.

(52.) The first law for the quality of the premises may be derived from the law for the distribution of the middle term. This could not be the case if every possible comparison of the spheres of two terms, both internal and external, positive and negative, found a corresponding expression among the categorical forms: for in that case, a law regarding quantity could not affect quality. This however has been shewn not to be the case, as external spheres are never made subjects; and hence arises the possibility of deducing from the law for the distribution of the middle term the following law for the quality of the premises.

No conclusion is possible from two negative premises. For in premises of this form, the extremes are each placed in the external sphere of as much of the middle term as is compared with them, and consequently the external sphere becomes the real term with which both extremes are compared. But the external sphere is not distributed in any categorical form, and consequently the virtual

middle term would be undistributed, and no conclusion possible.

No. B is A. No. C is B.

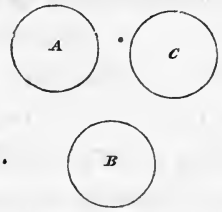


Fig. 1.

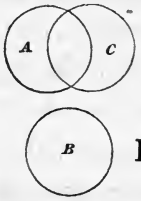


Fig. 2.

In the accompanying diagram we see that A and C are each placed in the external sphere of B; but as the external sphere is undistributed in both propositions, we do not know that A and C are compared with the same parts of it, and cannot therefore compare them with one another. In Fig. 1. we find that 'no C is A,' and in Fig. 2. the contradictory 'some C is A.'

As the external spheres of conceptions do not admit the variations of quantity, or bear the same mutual relations in any categorical propositions as the internal spheres, they are never understood unless they are expressly mentioned. It is for this reason that the law for the distribution of the middle term is generally understood to relate to the internal spheres only, and that the law against two negative premises cannot be subsumed under it as a particular case. It is therefore given

as a separate law, that at least one premiss must be affirmative.

The extreme term contained in the affirmative premiss will of course agree and coincide with the middle term, and will therefore agree or disagree with all with which the middle term agrees or disagrees in the other premiss. Hence the latter premise may be either affirmative or negative, and there is no other law for the quality of the premises, than that given above.

(53.) We have now exhausted the elements of the premises, (for we have shewn that our present inquiry does not involve the distinction of the premises, or the consideration of the major and minor terms,) and have arrived at the following laws for the middle term, and the quality of the two copulas.

In order that a conclusion for the reason, though not necessarily categorically expressible, be possible from any particular forms of premises, it is only necessary—

1st. That these categorical forms contain at least one distributed term.

2nd. That one of these forms be affirmative.

As at present there is no distinction between the premises, we are not considering permutations but combinations; and as each proposition may be combined with itself, the number will

be $\frac{5 \cdot 4}{1 \cdot 2} = 10$, of which we shall find by the following table, that 6 are unobjectionable, that 3 are excluded by their negative premises, and 1 by the want of a distributed term.

	Conclusion.	Forms of premises from which no conclusion is possible.		Forms of premises from which a conclusion at least for the reason, is possible.
		No distributed term.	No affirmative term.	
A combined with	A	——	——	A A
	E	——	——	A E
	I	——	——	A I
	O	——	——	A O
E combined with	E	——	E E	——
	I	——	——	E I
	O	——	E O	——
I combined with	I	I I	——	——
	O	——	——	I O
O combined with...	O	——	O O	——

The above table is only intended to state, that some conclusion, though perhaps not categorically expressible, is sometimes possible in each of the six forms in the last column, but always impossible in the four forms in the other two columns. And it must be observed that we can only say sometimes possible; for though all these six forms contain one or more distributed terms, yet if the middle is not one of those terms, it will be undistributed, and no conclusion possible. For

instance, let B be the middle term, and A I the form of the premises, if we say 'All B is A,' 'Some C is B,' the conclusion that 'Some C is A,' is strictly deducible. But if we say 'All A is B,' 'Some C is B,' therefore 'Some C is A,' our conclusion would not be logically correct, as the middle term B would be undistributed in each premiss. We repeat, therefore, that the last table merely indicates the possibility of deducing a conclusion for the reason from some premises of certain forms, and the impossibility of deducing any conclusion whatever from premises of certain other forms.

(54.) We may now dismiss the first part of our present investigation, and consider the second question. When can the conclusion be expressed in any of the legitimate forms, and when can it not?

As the variations of quality have not been allowed to affect the terms * in the categorical forms of the admissible premises, the conclusion from them that is possible for the reason, but not categorically expressible, cannot be so restricted, on account of its being valid for

* Perhaps the following explanation will be more easily understood than the text. As external spheres have not been admitted as terms in the forms of premises given in the above table, it is impossible that they should appear in the conclusion; the impracticability therefore of these conclusions cannot arise from the appearance of an external sphere in either of their terms.

only the external sphere of a conception. It must therefore belong to one of the four rejected forms (mentioned in Art. 32,) whose predicates do not as functions of the copula follow the same law with the accepted forms. In other words, the conclusion must belong to one of these four forms, in which the predicate of an affirmative is distributed, and of a negative undistributed. But it cannot belong to a proposition of the former class, as in that case one of the legitimate categorical propositions, in which the predicate is undistributed, would state less than this sound conclusion, and would therefore be contained in it, and be itself true; but this is contrary to the hypothesis. Hence the only case that remains in which a conclusion can be valid for the reason, but not categorically expressible, is when a conclusion whose quality is negative has a predicate whose quantity ought to be undistributed. And we shall accordingly find that the rule for the quantity of the predicate of the conclusion will exclude all those premises which give conclusions only possible for the reason.

(55.) Our next object is to determine what laws are sufficient and necessary to secure the legitimacy of the conclusion.

For this, let us examine the three elements

of the conclusion—the subject, the predicate, and the copula.

As the only variations of which the terms admit are those of quantity, the laws concerning them must respect that, and that only.

As, moreover, logic can only consider the formal quantity of a term, either extreme may contain in the conclusion the same quantity as in its premiss, but not more. Hence the only rule for the terms is this:

If the major or minor terms are undistributed in the premises, the predicate and subject must be respectively undistributed in the conclusion.

When this rule is violated in a syllogism whose major term is undistributed in the major premiss, but whose predicate is distributed in the conclusion, the resulting fallacy is called an illicit process of the major.

When the minor term is undistributed in the minor premiss, and the subject is distributed in the conclusion, the resulting fallacy is called an illicit process of the minor.

(56.) With regard to the quality of the copula, the only law for the conclusion is this:

If either premiss be negative, the conclusion must also be negative; but if both premises are affirmative, the conclusion must also be affirmative.

For as one premiss must be affirmative, the extreme term which it contains must agree with the middle term in that premiss, and therefore agrees or disagrees in the conclusion, with whatever the middle term agrees or disagrees with in the other premiss. Whatever therefore is the quality of this latter premiss must also be the quality of the conclusion.

(57.) The elements of a categorical syllogism have now been completely exhausted, and it is absolutely certain that if all the given rules are preserved inviolate, a formally incorrect conclusion can never be obtained.

All then that is necessary to ensure the legitimacy of a syllogism, is comprised in the five following rules :—

1. There cannot be more than one negative premiss.
2. If there is one negative premiss, the conclusion is negative; if there is no negative premiss, the conclusion is affirmative.
3. The middle term must be distributed in at least one of the premises.
4. If the predicate of the conclusion is distributed, the major term must be distributed in the major premise.
5. If the subject of the conclusion is distributed, the minor term must be distributed in the minor premiss.

The rules that have been given for the premises will only ensure a conclusion possible for the reason, and hence it will follow that the rules for the conclusion will in certain cases affect the premises also. For if the conclusion is negative, its predicate must be distributed; and therefore, by Rule 4, the major term must also be distributed in the major premiss.

(58.) Although the five given rules are quite sufficient in themselves, yet two others are derived from them, with which the student should be well acquainted, as they are of very easy application. They are—

1. No conclusion can be drawn from particular premises.
2. Only a particular conclusion can be drawn where one of the premises is particular.

As the middle term must always be distributed in one premiss at least, and as no term can be distributed in the conclusion that is not distributed in the premises, it follows that there must be at least one more distribution in the premises than in the conclusion. But there can be only one distribution in the predicates of the premises, as there can be only one negative premiss, and in that case there must be a distribution in the predicate of the conclusion, as that must also be nega-

tive. Hence it follows that the number of distributions in the subjects of the premises must exceed by at least unity, the number of distributions in the subject of the conclusion. If then both premises are particular, there will be no distributions in the subjects of the premises; and as the above condition will not be answered, there can be no conclusion. And if one premiss is particular, there will be only one distribution in the subjects of the premises, and therefore there can be none in the subject of the conclusion, *i. e.* the conclusion must be particular.

(59.) We shall now be able to extend our table for the premises only, and determine the moods in which a syllogism, perfect in all its parts, is possible. It must however be remembered, that as the table of sound premises paid no respect to the distinction of major and minor premiss, the order of the premises was there indifferent. But as the conclusion is here considered in its legitimate categorical forms, the distinction holds, and we must therefore examine the two permutations of each of those forms of premises.

Premises.	Conclusion.	Moods in which Paralogism is unavoidable.			Moods in which Syllogism is possible.
		Illicit Process of Minor.	Undistributed Middle.	Illicit Process of Major.	
A A with	A	—	—	—	A A A
	I	—	—	—	A A I
A I with	A	A I A	—	—	—
	I	—	—	—	A I I
I A with	A	I A A	or I A A	—	—
	I	—	—	—	I A I
A E with	E	—	—	—	A E E
	O	—	—	—	A E O
E A with	E	—	—	—	E A E
	O	—	—	—	E A O
A O with	E	A O E	or A O E	or A O E	—
	O	—	—	—	A O O
O A with	E	O A E	or O A E	or O A E	—
	O	—	—	—	O A O
E I with	E	E I E	—	—	—
	O	—	—	—	E I O
I E with	E	—	—	I E E	—
	O	—	—	I E O	—
I O with	E	I O E	or I O E	I O E	—
	O	—	—	I O O	—
O I with	E	O I E	O I E	or O I E	—
	O	—	O I O	or O I O	—

	SUBJECT.	PREDICATE.
A	Distributed.	Undistributed.
E	Distributed.	Distributed.
I	Undistributed.	Undistributed.
O	Undistributed.	Distributed.

The following example will shew how the above table should be studied.

Let us take the mood O A E. In this mood the predicate is distributed in the major premiss, and the subject in the minor premiss, and both subject and predicate in the conclusion. Hence it follows that either some term must be distributed in the conclusion which was not distributed in the premises, or else the middle term cannot be distributed in either premiss. We cannot therefore determine at once which form the fallacy will take, but may be quite certain that there must be either an illicit process of major or minor, or else an undistributed middle. Again, in the mood O I E, both subject and predicate are distributed in the conclusion, whereas no term is distributed in the minor premiss, and it therefore follows that there must be an illicit process of the minor. It is also evident that the middle term cannot be distributed in the minor premiss, and that if it is distributed in the major premiss, the major term must be undistributed, and consequently there must be a fallacy either of undistributed middle or illicit major.

(60.) It will be seen from the last column in the table, that there are eleven moods in which syllogism is possible, or in which the syllogistic

rules may be observed. But it does not follow that the rules of syllogism are necessarily observed in these eleven moods, as paralogism is possible in all but two of them ;* for in the premises of some of the moods we have but one distributed term, and in others two or more; and unless the position of the terms is such as to obey the laws for the distribution of the middle term, and prevention of illicit process, fallacy will still be the inevitable result.

The position of the terms will accordingly give rise to a further classification of categorical syllogisms. And as each premise admits of two permutations, in one of which the middle term is predicate, and in the other subject, there will be four combinations determined by its position, which are usually called the four syllogistic figures.

In the first figure, the middle term is the subject of the major premiss, and predicate of the minor.

In the second figure, the middle term is the predicate of both premises.

In the third figure, the middle term is the subject of both premises.

In the fourth figure, the middle term is the

* These two moods are E A O, and E I O, which are true in all the four figures.

predicate of the major, and subject of the minor premiss.

The following scheme will enable the reader to understand the distinction at a glance.

Let S represent the minor term (or subject of conclusion), M the middle term, and P the major term, (or predicate of conclusion).

	1st Fig.	2nd Fig.	3rd Fig.	4th Fig.
Major Premiss	M — P	P — M	M — P	P — M
Minor Premiss	S —M	S — M	M — S	M— S
Conclusion	S — P	S — P	S — P	S — P

In each of these figures several moods are sound, and others unsound. For instance, the mood A A A, which is sound in the first figure, in the second figure would have its middle undistributed in each premiss, while the mood A E E, which is sound in the second figure, would contain an illicit process of the major in the first figure. The accompanying table will shew what moods are sound, and what unsound, in each figure, and in the latter case, the peculiar form of the fallacy.

TABLE OF CATEGORICAL SYLLOGISM.

Name of Mood.	Form of Mood.	1st Figure.	2nd Figure.	3rd Figure.	4th Figure.
	Subject Premiss	M — P S — M S — P	P — M S — M S — P	M — P M — S S — P	P — M M — S S — P
A A A	D — U D — U D — U	Sound	Undistributed Middle	Illicit Minor	Illicit Minor
A A I	D — U D — U U — U	Sound	Undistributed Middle	Sound	Sound
A I I	D — U U — U U — U	Sound	Undistributed Middle	Sound	Undistributed Middle.
I A I	U — U D — U U — U	Undistributed Middle	Undistributed Middle	Sound	Sound
A E E	D — U D — D D — D	Illicit Major	Sound	Illicit Major	Sound
A E O	D — U D — D U — D	Illicit Major	Sound	Illicit Major	Sound
A O O	D — U U — D U — D	Illicit Major	Sound	Illicit Major	Undistributed Middle
E A E	D — D D — U D — D	Sound	Sound	Illicit Minor	Illicit Minor
E A O	D — D D — U U — D	Sound	Sound	Sound	Sound
E I O	U — D D — U U — D	Sound	Sound	Sound	Sound
O A O	U — D D — U U — D	Undistributed Middle.	Illicit Major	Sound	Illicit Major

In the first column of this table, the name of the mood is given. In the second, its form with regard to the distribution of its terms, where D signifies distributed, and U signifies undistributed. In the other four columns, which are headed by the forms of the four figures, the nature of each mood in each figure is expressed by the word 'sound,' if the reasoning is unobjectionable, and if not so, by the name of its particular fallacy.

By comparing the form of one of the moods with the general form for any one of the figures given in the upper line of the table, we shall see if any D in the one corresponds in position with an M in the other, in which case the middle will be distributed. We must also observe if either S and P in the conclusion correspond with a D in the form of the mood, and if so, they must correspond respectively with a D in the premises, or else there will be an illicit process. With this explanation there will be no difficulty in understanding the manner in which the table is formed. For instance, let us take the mood A A A. We find in the form of the mood that the subject in each premiss is distributed, and upon turning to the form of the first figure, we find that the subject of the major premiss is the middle term, and are therefore justified in concluding

that the mood A A A in the first figure has its middle distributed. Again, we find that the only term in the conclusion corresponding to a D, is S, which also corresponds to a D in the premises. We are therefore certain that no term is distributed in the conclusion that is not also distributed in the premises, or, in other words, that there is no illicit process; and as the middle is distributed, it follows that the syllogism A A A in the first figure is sound.

If however we compare the form of the mood A A A, with the form of the third figure, we find that S the subject of the conclusion corresponds to D, and is therefore distributed; but that S the predicate of the minor premiss corresponds to U, and is therefore undistributed: whence it follows that A A A in the third figure has an illicit process of the minor.

(61.) Several laws may be obtained for each figure, by an examination of their peculiar forms.

In the first figure, the minor premiss must be affirmative: for if it were negative, the major premiss must be affirmative, and therefore have its predicate, which is the major term, undistributed. But the conclusion must be negative, and therefore its predicate would be distributed, which would accordingly give rise to an illicit process of the major.

As the minor premiss must be affirmative, the middle term, which is its predicate, must be undistributed in that premiss, and therefore distributed in the other premiss, in which it holds the place of subject. Hence it follows that the major premiss must always be universal in the first figure.

In the second figure, the middle term is the predicate in each premiss; and as it must be distributed in one of them, one premiss must be negative, and therefore the conclusion also. In the third figure the minor premiss must always be affirmative for the same reasons as in the first figure; and therefore its predicate (which is the minor term), being undistributed, the conclusion must be particular, for were it universal, there would be an illicit process of the minor. There are several other rules which may be derived from the primary laws, but as all of them may be more simply evolved by means of algebraical symbols, we shall postpone their consideration for the present.

Transformation of the figures of Syllogism.

(62.) It has been already observed, that Aristotle's dictum (or the first figure) is the form in which our reasoning appears the most natural, and is most easily comprehended. This is the reason why the other three

figures have been considered as unnatural deviations from it, and that laws have been laid down for the reduction of all syllogisms to the original form of the first. But as this peculiarity of the dictum is based on the laws of an understanding-conception, and as Formal Logic can pay no attention to a distinction which originates in grounds that lie out of its field, it will be more correct to consider the laws for transforming a syllogism from any one figure into another, especially as they will include the laws for reduction (or transformation to the first) as a particular case. As the distinction of figure depends entirely on the position of the terms, conversion, by which alone this can be altered, is the only method of transformation. But this operation is not always possible, as in many of the moods the propositions are not of a convertible form: *e. g.* it is impossible to transform the mood A E O from the second figure into the first; for the major premiss is not simply convertible, and limited conversion would give the mood I E O, which contains an illicit process of the major. The following table can therefore only give those conditions which must be answered by any syllogism in each figure for its transformation into any other; but in order to know if a syllogism is capable of answering

these conditions, it will be necessary to examine its particular mood.

TRANSFORMATION TABLE.

Figure to be transformed.	Propositions to be converted for transformation into the			
	First figure	Second figure	Third figure	Fourth figure
First		Major	Minor	Conclusion * or Major & Minor
Second	Major		Major and Minor	Minor or Major & Conclusion
Third	Minor	Major and Minor		Major
Fourth	Conclusion or Major & Minor	Minor	Major	

(63.) It appears from the table at Art. 60, that there are six moods in each figure which answer all the required conditions for a sound categorical syllogism. Five of these have been very generally rejected by logicians, on the grounds of their having particular conclusions, although universal are warranted by the premises.† But this regard to a more prac-

* It is hardly necessary to observe, that whenever the conclusion is converted, the major and minor terms, which are respectively its predicate and subject, must be interchanged, and therefore the premises that contain them.

† These five are the moods A A I in the first figure, E A O in the first and second, and A E O in the second and fourth.

tical utility is always very unphilosophical in an *à priori* science, and especially if it be at all destructive of the symmetry of our results. The mathematician will readily acknowledge his obligations to symmetry for the light it throws upon truths already known, as well as for its efficiency as an organum for the discovery of new ones: and the same regard should be paid to it in every pure science, but more particularly in one which is intended to increase the accuracy and rigid strictness of our thought. In the present case there are six syllogisms in each of the four figures, and this reduction would have only nineteen, four in the first and second, six in the third, and five in the fourth. Some of the old schoolmen carried their veneration for Aristotle so high, as to reject the fourth or Galenic * figure entirely, and thus reduced the whole number to fourteen. But this reduction is nearly as unphilosophical as the other, for the only rational ground upon which it can rest will apply to the second and third figures also, though not perhaps to the same extent. We shall therefore submit to the reader the whole

* The fourth figure was first recognised by Galen, the great medical philosopher, who flourished in the second century.

twenty-four syllogisms, collected under their respective figures.*

Fig. 1. A A A, A A I, A I I, E A E, E A O, E I O.
Fig. 2. A E E, A E O, A O O, E A E, E A O, E I O.
Fig. 3. I A I, A A I, A I I, O A O, E A O, E I O.
Fig. 4. A E E, A A I, I A I, A E O, E A O, E I O.

Hypothetical Syllogism.

(64.) One premiss of a hypothetical syllogism is a hypothetical proposition; the other premiss is a categorical proposition, and either asserts

* There is a barbarous practice of naming the various forms of a categorical syllogism by certain words which constitute mnemonic hexameters. A subject which should always be treated in a rational point of view (*i. e.* as appertaining to the reason), is in this manner degraded to a mere historical record of the deductions of others, and draws upon the memory alone. Having entered my protest against these lines, I still think it proper to subjoin them, in order that the student may understand the allusion when he hears such phrases as 'a syllogism in barbara,' &c. The vowels contained in the words of these lines give the names of the moods, and the consonants refer to their other peculiarities,—such, for instance, as the methods of reducing them to the first figure. The two first lines give the nature of the four categorical propositions.

Asserit A, negat E, verum generaliter ambæ.
Asserit I, negat O, sed particulariter ambæ.

Barbara, Celarent, Darii, Ferioque, prioris
Cesare, Camestres, Festino, Baroko, secundæ.
Tertia, Darapti, Disamis, Datisi, Felapton,
Bokardo, Ferison habet: Quarta insuper addit
Bramantip, Camenes, Dimaris, Fesapo, Fresison:
Quinque Subalterni, totidem Generalibus orti,
Nomen habent nullum, nec, si bene collegis, usum.

the antecedent, or denies the consequent. In the former case, which is called the modus ponens, the conclusion infers the truth of the consequent; in the latter case, which is called the modus tollens, the conclusion infers the falsity of the antecedent. The general forms of these two cases are, 'If A is, B is; but A is; therefore B is;' and 'If A is, B is; but B is not; therefore A is not.' Example, 'If what we learn from the bible is true, we ought not to do evil that good may come; but what we learn from the bible is true; therefore we ought not to do evil that good may come.'

These are the only two forms which a hypothetical syllogism can assume. For no variation can enter on the side of the hypothetical (which is usually styled the major) premiss, as there is but one form of such propositions; neither can there be any other form for the categorical (which is usually styled the minor) premiss than those already mentioned, for nothing can be inferred by denying the antecedent or asserting the consequent. As, moreover, the latter premiss only concerns the truth or falsity of the members of the hypothetical, all variations in its form, when considered merely as a categorical proposition, must affect its matter and not its form when considered as the minor premiss.

Disjunctive Syllogism.

(65.) In this syllogism, we commence with a disjunctive judgment, and proceed either by asserting the truth of one member of the division, and thence inferring the falsity of all the rest, which is called the 'modus ponens,' or else by asserting the falsity of all the members but one, and hence inferring the truth of that one, which latter method is called the 'modus tollens.' The general form of these two cases will be, 'Either A is, or B is, or C is; but A is; therefore neither B is, nor C is.' And 'Either A is, or B is, or C is; but neither B is, nor C is; therefore A is.' We may take as an example 'Either the Pope is infallible, or there is at least one great error in the Romish church; but the Pope is not infallible; therefore there is at least one great error in the Romish church.'

These may be shewn to be the only forms of a disjunctive syllogism by reasoning very similar to that employed in the case of the hypothetical.

Dilemma, &c.

(66.) Besides the three simple forms of syllogism already mentioned, there are several others, of which perhaps the Dilemma is the most important. This is an hypothetical syllogism, whose consequent is divided into members by

a disjunctive judgment. Thus, 'if A is B, either C is D, or E is F' is the general form of the major premiss of a dilemma; and as it is hardly ever used except in the modus tollens, the minor premiss and conclusion will be 'But neither C is D, nor E is F, therefore A is not B.'

(67.) The following are examples of combinations of premises which differ from those already given in respect of the moments of relation. Thus, two hypotheticals will give—

'If A is B, C is D; but if C is D, E is F; therefore if A is B, E is F.'

Or, 'If A is B, C is D; but if E is F, C is not D; therefore if E is F, A is not B.'

'If A is B, C is D; and if A is not B, E is F; therefore either C is D, or E is F.'

In the same manner two disjunctives will give—

'A is either B or C; but B is either D or E; therefore A is either C or D or E.'

Or a categorical and disjunctive—

'A is either B or C; D is A; therefore D is either B or C.'

Enthymeme.

(68.) The Enthymeme is a syllogism abridged by the suppression of one of its premises, which is nevertheless understood, as the argument

would not be valid without it. For, as the conclusion and either premiss are sufficient to indicate what the other premiss must be, we rarely express both premises in practice, but generally leave one of them to the hearer or reader to supply. The following is an example of a categorical enthymeme:

'The science of Logic is very useful, as it enables us to detect the formal fallacies in the arguments of our adversaries'. Here the major premiss is suppressed. The completed syllogism will stand thus—

'Whatever enables us to detect the formal fallacies in the arguments of our adversaries is very useful; the science of Logic enables us, &c.; therefore the science of Logic is very useful.' Had the minor premiss been suppressed, the enthymeme would have been—

'The science of Logic is very useful, for any thing is useful that enables us to detect the formal fallacies in the arguments of our adversaries.'

The following is an example of an hypothetical enthymeme:—

'It will certainly rain, for the sky looks very black.'

In this case the major premiss is suppressed. The syllogism when completed would stand thus—

'If the sky looks black, it will certainly rain.

'The sky does look black.

'Therefore it will certainly rain.'

Had the minor premiss been suppressed, the enthymeme would have been of the following form :—

'It will certainly rain, for it always rains if the sky looks black.'

The following examples are two disjunctive enthymemes in which the major and minor premises of the same syllogism are respectively suppressed :—

'He must be in York, for he is not in London.'

The suppressed premiss is, 'he must be either in London or York.'

If the minor premiss is suppressed the enthymeme will become—

'He must be in York, for he must be either in London or York.'

Sorites.

(69.) In a Sorites the conclusion of a syllogism is not expressed, but made the suppressed premiss of an enthymeme whose conclusion may be made the suppressed premiss of another, and similarly for any number of enthymemes. Thus, 'B is A, C is B, D is C, E is D;

therefore E is A' is a categorical Sorites. Again, 'If A is, B is; if B is, C is; if C is, D is; but D is not; therefore A is not,' is a specimen of an hypothetical Sorites.

SECTION V.

THE DEDUCTIO AD ABSURDUM, OR INDIRECT PROOF.

(70.) This name is given to a circuitous method of proving one proposition from two or more others, by means of at least three syllogisms. As, however, the principle of the proof is quite independent of the number of given propositions, our present object will be fully answered by an investigation of that case, in which they are limited to two. And, moreover, as the forms of syllogism contain all the principles or functions of the reason, by which one proposition can be thought as necessarily connected with several others, it follows, that any conclusion at which we can arrive by the *deductio ad absurdum*, might also have been obtained by the direct application of one of the regular syllogistic forms of ratiocination. We may therefore consider the given propositions, and the one to be deduced from them, as the premises and conclusion of a syllogism, and proceed to shew how this conclu-

sion may be obtained by a different chain of reasoning.

The method, then, consists first, in assuming the falsity of the conclusion and truth of one premiss, and deducing from these propositions as premises, the falsity of the other premiss, as a conclusion; secondly, in taking this conclusion as the consequent, and the premises of the last syllogism as the antecedent in a hypothetical syllogism, and inferring the falsity of the antecedent by the modus tollens; thirdly, in dividing this falsity in a disjunctive syllogism into its three members, viz. the falsity of each proposition separately, or of both together, and inferring the falsity of that member of the division which is the contradictory of the original conclusion by the modus ponens. But the reader will understand this method more easily by examining the following general form:

Let A and B represent the premises, and C the conclusion of any syllogism. In order to prove C by the indirect method, we commence with assuming that C is not true. The three syllogisms may be then stated as follows:

First syllogism: 'A is; C is not; therefore B is not.

Second syllogism: 'If A is, and C is not,

it follows that B is not; but B is; therefore it is false that "A is and C is not.'"

Third syllogism: 'Either both propositions "A is" and "C is not" are false, or else one of them is false; but that "A is" is not false; therefore that "C is not" is false, (*i. e.* C is').

The hypothetical syllogism is rarely if ever expressed in practice; the disjunctive, perhaps, never. But, in an analysis of the indirect proof, it would be just as unreasonable to neglect the consideration of these syllogisms on the ground of their being rarely expressed, as it would be in an analysis of syllogism generally to neglect the consideration of one of the premises on the ground of our usually reasoning in enthymemes.

Although the *deductio ad absurdum* requires premises from which the conclusion might have been deduced by the direct method, yet is it frequently very useful when these premises are of such a nature as not to admit of a very convenient syllogistic form. It is on this account not unfrequently used in the propositions of geometry, though Euclid has occasionally introduced it when the direct proof would have been equally simple. An instance of this will be found in the fourth proposition of the third book, in which it is required to prove that 'If in a

circle two straight lines cut one another which do not both pass through the centre, they do not bisect each the other.' The indirect proof assumes that they bisect each other, and then shews that they must both be perpendicular to a line joining the centre and the point of their intersection, which is absurd; therefore, &c. Whereas the direct proof states that all chords which are bisected by the line drawn from the centre to the point of intersection must be perpendicular to that line; but both of these chords are not perpendicular to that line; therefore both of these chords are not bisected by the line drawn from the centre to the point of their intersection, which cannot therefore be the point of their bisection.* But every proposition which admits the *deductio ad absurdum*, will also admit of a direct proof from the same data, though in a great many cases the direct proof would be exceedingly clumsy, and not nearly as simple as the indirect. There is a very striking instance of this in the usual proof of the falsity of a hypothetical or disjunctive proposition from two categorical premises. The reasoning is rather abstruse, but it bears too completely upon the present subject to be entirely

* This syllogism is the mood A O O in the second figure.

overlooked, and is therefore subjoined in a note.*

* Hypothetical and disjunctive differ from categorical propositions in not possessing the quality of negation objectively. For if the cognition upon which any one of them is grounded (*i. e.* the dependence of one particular cognition upon another, or its division into members) does not hold in nature, there is no other hypothetical or disjunctive proposition which can simply assert this want of objectivity. This remark has been made already (Art. 42—44) where it was observed that a proposition which simply denies the dependence of a particular cognition on another, or the completeness of the division of a cognition, in neither case gives any new dependence of cognitions, or any new exhausting division, and consequently cannot be either hypothetical or disjunctive, but must be simply categorical. If then two categorical propositions are granted as premises, from which we are to deduce as conclusion the falsity of an hypothetical or disjunctive proposition, these two premises must be referred to the thinking subject as the only middle term by which they can be united in an act of reason, for all common objective grounds are denied them by the very nature of the case. This necessity for a subjective reference renders the reasoning so much more abstruse, that the mind naturally chooses the other method of *deductio ad absurdum*, which, from its objective nature, is much easier of comprehension. In this method we assume the falsity of our desired conclusion (which conclusion is, in this case, the contradictory of an hypothetical or disjunctive proposition) and therefore assume the truth of the hypothetical or disjunctive, and conjoining it with one of our given premises, deduce the falsity of our other premiss; in this manner we entirely avoid the necessity of any reference to the thinking subject. We will exemplify this reasoning as follows:—

Let the given premises be, 'A is; B is not,' from which we are to deduce the falsity of the hypothetical proposition,

'If A is, B is.'

If I would deduce this falsity (which being the contradictory of a hypothetical must be contained in a categorical proposition) by the direct method, I must refer the two premises to the thinking subject 'I' in some such manner as the following:—

(71.) The *deductio ad absurdum* supplies the principle upon which may be founded a rather pretty and symmetrical arrangement of the twenty-four categorical syllogisms. It also suggests a method of proving the necessary equality of the moods true in the first three figures without the aid of mathematical analysis, and of shewing the reason why the number of negative syllogisms is exactly double the number of the affirmative. And although we do not propose to derive any particular practical advantage from its consideration, yet anything that tends to give additional order and theoretical completeness must always have a sufficient value in a pure science to warrant its insertion.

As in every categorical syllogism we may

'Whatever is in my present consciousness is conjoined in it with my assent to the conception of B not being.

'My assent to the conception of A being is in my present consciousness.

'Therefore my assent to the conception of A being is conjoined in my present consciousness with my assent to the conception of B being.'

This conclusion is the categorical statement of the falsity of the hypothetical which can only be shewn directly by this or some other equally clumsy method. The indirect proof however, is simple enough, and may be stated thus:

Let us assume that the hypothetical is true, or that 'if A is, B is; but A is; therefore B is; but B is not, therefore,' &c.

As we have already stated, the simplicity of the proof in this case arises from every premiss contained in it having an objective reference, which the contradictory of a hypothetical has not.

either employ the major premiss and contradictory of the conclusion to disprove the minor premiss, or the minor premiss and contradictory of the conclusion to disprove the major premiss, it follows that there must be two distinct syllogisms, with either of which we may commence an indirect proof. The forms which they respectively assume will readily appear from the following table :—

	Major Premiss and Contradictory of Conclusion being Premises.	Minor Premiss and Contradictory of Conclusion being Premises.
First Figure. $\left\{\begin{matrix}M-P\\S-M\\S-P\end{matrix}\right\}$ becomes	Second Figure. $\left\{\begin{matrix}M-P\\S-P\\S-M\end{matrix}\right\}$	Third Figure. $\left\{\begin{matrix}S-P\\S-M\\M-P\end{matrix}\right\}$
Second Figure. $\left\{\begin{matrix}P-M\\S-M\\S-P\end{matrix}\right\}$ becomes	First Figure. $\left\{\begin{matrix}P-M\\S-P\\S-M\end{matrix}\right\}$	Third Figure. $\left\{\begin{matrix}S-M\\S-P\\P-M\end{matrix}\right\}$
Third Figure. $\left\{\begin{matrix}M-P\\M-S\\S-P\end{matrix}\right\}$ becomes	Second Figure. $\left\{\begin{matrix}S-P\\M-P\\M-S\end{matrix}\right\}$	First Figure. $\left\{\begin{matrix}S-P\\M-S\\M-P\end{matrix}\right\}$
Fourth Figure. $\left\{\begin{matrix}P-M\\M-S\\S-P\end{matrix}\right\}$ becomes	Fourth Figure. $\left\{\begin{matrix}S-P\\P-M\\M-S\end{matrix}\right\}$	Fourth Figure. $\left\{\begin{matrix}M-S\\S-P\\P-M\end{matrix}\right\}$

From this table it is immediately evident that for every sound mood in the first figure,

there must also be a sound mood in the second and third; that for every sound mood in the second figure, there must also be one in the first and third; and for every sound mood in the third figure, one in the first and second. Hence it follows, that the number of moods that are sound in each of the first three figures must be the same. But the form of the fourth figure is such, that it only admits of an indirect proof by syllogisms in the same figure; and the equality, therefore, of the number of its moods to that of the moods in the other three figures, is not susceptible of this method of proof.

This table will supply the grounds of a division of categorical syllogisms into eight systems, containing three each. Six of these systems have one mood in each of the first three figures. The other two are contained entirely in the fourth. The systems are as follows:—

Figure	1	2	3	4	5	6
First	A A A	A A I	A I I	E A E	E A O	E I O
Second	A O O	A E O	A E E	E I O	E A O	E A E
Third	O A O	E A O	E I O	I A I	A A I	A I I

Fourth Figure.

7	8
A A I	I A I
A E O	A E E
E A O	E I O

Each system must contain one affirmative and two negative syllogisms. For the contradictory of the conclusion of every affirmative syllogism must constitute one of the premises in its two complementary syllogisms, or those contained in the same system with itself; and as this contradictory must be a negative proposition, the two syllogisms that contain it must be negative also. Hence, every affirmative syllogism must have two complementary negative syllogisms. And as the affirmative contradictory of the conclusion of a negative syllogism may be combined with either its negative or its affirmative premiss, its two complementary syllogisms must themselves also be the one negative, and the other affirmative. As, then, every system contains one affirmative, and two negative syllogisms, it is evident that the whole number of negative must double the number of affirmative syllogisms.

SECTION VI.

SYMBOLICAL EXPRESSION FOR THE LAWS OF CATEGORICAL SYLLOGISM.

(72.) The conditioning laws of categorical syllogism admit of a very simple analytical expression from which all its properties may be readily obtained. But the more especial object in treating this subject mathematically, is the exhibition of that symmetry, from which, the equality of the number of moods that are true in the first three figures, may be derived *à priori* to all consideration of the moods themselves. Before, however, we proceed to make any assumptions, it is necessary to remind the reader, that the usual arithmetical interpretation of the symbols employed has no natural connection with the subject under consideration, but can merely be useful as an index to the laws of their combination. If, for instance, any sets of symbols be juxtaposed, and equated to zero, the equation will indicate that at least one of these factors may itself be singly equated to zero; and, in that case, all its con-

stituent symbols must receive whatever interpretations may arise from the transposition of terms, or any other operations, that are formally analogous to those of arithmetical algebra, and have been admitted in our particular application of the science. In the present case the conception of homogeneity is not introduced, and it will therefore follow, that, if several symbols are equated to several others, each of those on one side of the equation must be considered as equated to one on the other, but no division of a symbol into parts will be considered admissible.

The laws of categorical syllogism have been already once stated, but are nevertheless repeated here, as a trifling alteration in the manner of expressing those respecting quality will be necessary for their reduction to a mathematical form. As the latter will be represented in a single equation, it will be more convenient to throw them into one rule, which may be stated as follows:—

(1.) At least one of the premises must have an affirmative copula, and the quality of the conclusion will be the same as that of the remaining premiss.

As this law respects the quality of the copulas, which will always determine the quantity of the predicates, it may be written thus:

1. The predicate of at least one of the premises is undistributed, and the predicate of the conclusion will be of the same quantity as the predicate of the other premiss.

The other three laws are—

2. The middle term must be distributed in at least one of the premises.

3. The major term must not be distributed in the conclusion, unless it has been distributed in the major premiss.

4. The minor term must not be distributed in the conclusion, unless it has been distributed in the minor premiss.

Let u represent an undistributed term.

Let d represent a distributed term.

Also, let p_1, p_2, p_3, and s_1, s_2, s_3, represent the predicates and subjects respectively of the three propositions as expressed below.

	SUBJECTS.	PREDICATES.
Major premiss	s_1	p_1
Minor premiss	s_2	p_2
Conclusion	s_3	p_3

where each of these symbols must $= d$ or u.

Now, observing from rule (1), that at least one of the predicates of the premiss (i. e. p_1, p_2) must be undistributed or $= u$, we may express the other predicate as $= p_1 + p_2 - u$.

But by the latter clause of law (1) we also find that whatever is the quantity of that pre-

dicate, must also be that of the predicate of the conclusion, and we shall therefore have

$$p_3 = p_1 + p_2 - u, \ldots \text{law (1)};$$

and this equation will be a correct expression for law (1).

Now from law (2) we find that the middle term must be distributed (i.e.$=d$), in at least one premiss, and as s_1 and p_2 are the middle term in the first figure, one or both of the following equations must be true in that figure,

$$(s_1 - d) = 0$$
$$(p_2 - d) = 0;$$

and we shall therefore have

$$(s_1 - d)(p_2 - d) = 0 \ldots \text{law (2)}$$

as an equation expressing the second law for the first figure; and as the same reasoning will apply to all the four, we shall have

$$\left.\begin{array}{l} \text{Fig. (1)} \ldots (s_1 - d)(p_2 - d) = 0 \\ \text{Fig. (2)} \ldots (p_1 - d)(p_2 - d) = 0 \\ \text{Fig. (3)} \ldots (s_1 - d)(s_2 - d) = 0 \\ \text{Fig. (4)} \ldots (p_1 - d)(s_2 - d) = 0 \end{array}\right\} \ldots \text{law (2).}$$

Again, from law (3) we know that either the predicate of the conclusion, i. e. p_3, must be undistributed or $= u$, or else the major term which is either s_1 or p_1 according to the figure must be distributed or $= d$; and by reasoning similar to the preceding we shall have

$$\left.\begin{array}{l}\text{Fig. (1)} \ldots . (p_1 - d)(p_3 - u) = 0 \\ \text{Fig. (2)} \ldots . (s_1 - d)(p_3 - u) = 0 \\ \text{Fig. (3)} \ldots . (p_1 - d)(p_3 - u) = 0 \\ \text{Fig. (4)} \ldots . (s_1 - d)(p_3 - u) = 0\end{array}\right\} \ldots \text{law (3).}$$

In precisely the same manner we may obtain the following expressions for law (4).

$$\left.\begin{array}{l}\text{Fig. (1)} \ldots . (s_2 - d)(s_3 - u) = 0 \\ \text{Fig. (2)} \ldots . (s_2 - d)(s_3 - u) = 0 \\ \text{Fig. (3)} \ldots . (p_2 - d)(s_3 - u) = 0 \\ \text{Fig. (4)} \ldots . (p_2 - d)(s_3 - u) = 0\end{array}\right\} \ldots \text{law (4).}$$

We shall now assume the symbols p'_3 and s'_3 of such a nature that

$$p'_3 + p_3 = d + u \ldots\ldots\ldots (5).$$
$$\text{and} \quad s'_3 + s_3 = d + u \ldots\ldots\ldots (6).$$

And as it has been already stated that homogeneity is not introduced in the conception of our symbols, it will follow from these equations that p'_3 and s'_3 are each $= d$ or u. They will also be respectively complementary to p_3 and s_3 in such a manner that when one $= u$, the other $= d$, and *vice versa;* and they will therefore be of precisely the same nature as the other six symbols, p_1, p_2, &c.

From (5) and (6) we obtain for the values of p_3, s_3 respectively

$$p_3 = d + u - p'_3$$
$$s_3 = d + u - s'_3.$$

And substituting these values of p_3 and s_3 in the equations (1), (3), and (4), we shall get

the following sets of equations for the four figures of categorical syllogism.

* $p_1 + p_2 + p'_3 = d + 2u \ldots$ (1)
$(s_1 - d)(p_2 - d) = 0 \ldots$ (2)
$(p_1 - d)(p'_3 - d) = 0 \ldots$ (3)
$(s_2 - d)(s'_3 - d) = 0 \ldots$ (4)
} First figure.

$p_1 + p_2 + p'_3 = d + 2u \ldots$ (1)
$(p_1 - d)(p_2 - d) = 0 \ldots$ (2)
$(s_1 - d)(p'_3 - d) = 0 \ldots$ (3)
$(s_2 - d)(s'_3 - d) = 0 \ldots$ (4)
} Second Figure

$p_1 + p_2 + p'_3 = d + 2u \ldots$ (1)
$(s_1 - d)(s_2 - d) = 0 \ldots$ (2)
$(p_1 - d)(p'_3 - d) = 0 \ldots$ (3)
$(p_2 - d)(s'_3 - d) = 0 \ldots$ (4)
} Third Figure.

$p_1 + p_2 + p'_3 = d + 2u \ldots$ (1)
$(p_1 - d)(s_2 - d) = 0 \ldots$ (2)
$(s_1 - d)(p'_3 - d) = 0 \ldots$ (3)
$(p_2 - d)(s'_3 - d) = 0 \ldots$ (4)
} FourthFigure

(73). If we examine the equations to the first three figures, we shall find each set per-

* The following is the most general symbolical expression for the syllogistic laws.

Let x and y represent the middle term in the major and minor premises respectively, and m and n the major and minor terms. The equations will then be equally applicable to all the four figures, and will assume the following forms:

$$p_1 + p_2 + p'_3 = d + 2u \ldots (1).$$
$$(x - d)(y - d) = 0 \ldots (2).$$
$$(m - d)(p'_3 - d) = 0 \ldots (3).$$
$$(n - d)(s'_3 - d) = 0 \ldots (4).$$

where $x + m = p_1 + s_1 \ldots (5).$

and $y + n = p_2 + s_2 \ldots (6).$

fectly symmetrical with respect to the other two. For in equation (1), which is common to all the three figures, the symbols p_1, p_2, p_3 are perfectly symmetrically involved, and the only assumptions that have been made respecting s_1, s_2, s_3 are that each of them must either $=$ d or u. Hence any interchange among the three symbols s_1, s_2, s'_3 or the three p_1, p_2, p'_3 will not in the least affect the form of the equations. But if we interchange p_2 and p_3' in the equations to the first figure, we shall obtain the equations to the second; and if we interchange s_1 and s'_3 in the first figure, we shall obtain the equation to the third; or lastly, if we interchange p_2 and p'_3, also s_1 and s_3', in the equations to the third figure, we shall obtain those to the second; and of course the same interchanges will reproduce the first from the second, the first from the third, &c.: hence it follows that the sets of equations to the first three figures are perfectly symmetrical with regard to each other.*

If however it were required to obtain the

* Although the sets of equations to the first three figures are perfectly symmetrical with respect to each other, yet does it by no means follow that the corresponding equations represent the same laws. The equation that contains the law against illicit major in the first figure, corresponds to the similar equation in the third; but in the second figure it corresponds to the equation containing the law for the distribution of the middle term; and similarly of the others.

equations to the fourth figure from those to either of the other three, it would be necessary to interchange one or more of the three symbols s_1, s_2, s_3' with one or more of the symbols p_1, p_2, p_3'; and this cannot be admitted, as the three latter symbols are all involved in equation (1), whereas the three former are neither involved in that or any other corresponding equation; and hence it follows that the equations to the fourth figure are not symmetrical with those to the other three.

(74.) As the symbols are symmetrically involved in the equations to the first three figures, we can know *à priori* to all other considerations that there must be the same number of solutions, and therefore the same number of true moods for all of them. But as the equations to the fourth figure do not involve the symbols symmetrically with the equations to the other three, we cannot say at once that the number of their solutions must be the same as in those to the other figures, but can only shew that it is so by determining the number of solutions in each case. For this purpose it will be sufficient to investigate separately the number of solutions for the first and fourth figures.

We will commence by examining the first figure. It is evident from equation (1), that

one of the symbols p_1, p_2, p_3' must $= d$, and the other two each $= u$; and from equation (3) that either p_1 or p_3' must $= d$. Hence there will be two solutions for equation (3) (accordingly as p_1 or $p_3 = d$), which, will correspond to two solutions for equation (1).

But as equation (3) requires that either p_1 or p'_3 should $= d$, it follows from equation (1) that p_2 must always $= u$, and therefore from equation (2) that $s_1 = d_1$, or otherwise neither factor in equation (2) would vanish. Hence there is but one solution for equation (2), and only two solutions for the equations (1) and (3), as the latter are mutually dependent on each other. Equation (4) will have three solutions, accordingly as both together or either separately of the symbols s_2 and $s_3' = d$. And as the solutions of equation (4) are quite independent of the symbols involved in the equations (1), (2), (3), it follows that any one of the three solutions of the former may be combined with either of the two solutions of the other three equations, and thus produce six sets of solutions which will correspond to the six moods that are sound in the first figure.*

* Great care must be taken, in the interpretation of these equations into their corresponding moods, not to confound p'_3 with p_3, or s'_3 with s_3. The values of p'_3, and s'_3 are first determined

In the fourth figure we shall have three solutions for equation (1), accordingly as either of the three symbols p_1, p_2, or p'_3 may $= d$. Of the other three equations (2), (3), and (4), that which contains the particular symbol of the three p_1, p_2, p'_3 which $= d$, will admit of two solutions; but the two equations which respectively contain those two of the three symbols p_1, p_2, p'_3 that are $= u$, will admit but of one solution. Hence, each of the three solutions of equation (1) may be combined with the two solutions of one of the other three equations, and thus produce six combinations which will respectively answer to the six moods of the fourth figure.

Although we have only been able to prove that the number of moods in the fourth figure is equal to that in the other three, by the numerical tentative method already given, yet can we at least shew that no other method is possible. For it is evident that the only method by which such an equality can be shewn independently of numbers, is that of form, which has been already employed in be-

by the four equations to the figure under consideration, and from them the values of p_3 and s_3 are deduced by means of the equations

$$p_3 + p'_3 = d + u,$$
$$s_3 + s'_3 = d + u,$$

and will indicate the peculiar categorical form of the conclusion.

hoof of the first three figures. But the equations to those three figures completely determine two of their six symbols (s_1 and p_2 in the first; s_1 and p_3' in the second; and p_2 and s'_3 in the third), whereas the equations to the fourth do not determine a single one, but admit variations in all. Hence it follows that no artifice can bring the equations to the fourth figure under the same form as the equations to the other three, and consequently that all formal proof of the equality of the number of the solutions is absolutely impossible.

(75.) Among other advantages in the symbolical expression of the laws of categorical syllogism, we may mention the facility with which the derived secondary laws may be obtained, and the peculiar fallacies exposed which their violation entails. For instance, we know from equation (1), that one alone of the symbols p_1, p_2, p'_3 can $= d$; and moreover from equation (3) in the first figure, that either p_1 or p_3' must $= d$. We may therefore conclude that $p_2 = u$, that is to say, the predicate of the minor premiss in the first figure is undistributed, and the quality of its copula affirmative. But if $p_2 = u$, it will follow from equation (2) in the first figure that $s_1 = d$, or in other words that the subject of the major

premiss is distributed, and that premiss an universal proposition. Should either of these secondary laws be violated, the conditions of one of the equations (2) or (3) cannot be fulfilled, and there must either be a fallacy of undistributed middle, or illicit process of the major. In the same manner it may be proved, that in the second figure $s_1 = d$, and $p'_3 = u$, (or $p_3 = d$,) in other words, that the major premiss must be universal, and the conclusion negative. But these examples are sufficient to enable the reader to derive the other laws for himself.

Truth of Premises.

(76.) To assert that 'if the premises are true, the conclusion that is deduced from them must be true likewise,' is a mere tautology; for the very definition of a conclusion is 'that proposition, the truth of which follows necessarily from the truth of the premises.' But the converse of this proposition is by no means true, for it does not follow that if the conclusion is true, the premises from which it is deduced must be true also. A more satisfactory explanation of this subject will be given in a future section: the following, however, is

an unobjectionable proof by the method of the *deductio ad absurdum.**

Let us assume that if the conclusion is true, the premises must be true also; it will follow that if the premises are not true, the conclusion will not be true either. Let any sound mood in any figure be represented by the general symbols $x\,y\,z$, and let x', y', z', represent the formal contradictories of the propositions x, y, z respectively. Let one or both of the premises x and y be false; it follows from our present hypothesis, that z must be false also. If then, for example, x is false, and its falsity is sufficient to ensure the falsity of z, and if we substitute for x a proposition which merely states that falsity, we may also substitute for z a proposition which merely states its falsity, and thus change the form without affecting the soundness of the reasoning. But the contradictories of x and z respectively state the falsity of those propositions, and consequently a syllogism of the form $x'\,y\,z'$ must represent

* This proof will only strictly apply to categorical syllogisms. It may, however, be extended to the hypothetical and disjunctive by converting their form into the matter of a categorical. Thus the hypothetical, 'if A is, B is; A is, therefore B is,' may have its form put into the matter of a categorical in the usual way, commencing with 'all the cases of A being,' &c., and as this categorical syllogism may have false premises and true conclusion, it is evident the hypothetical may also.

an unobjectionable mood in the same figure as that of $x\ y\ z$. And as we might have assumed that y was false instead of x, or that both were false together, we shall have the three moods $x'\ y\ z'$, $x\ y'\ z'$, and $x'\ y'\ z'$ all sound in the same figure as that of $x\ y\ z$.

But contradictories differ from each other in the quantity both of their predicates and subjects. If, then, we recur to the symbolical expression of the syllogistic laws (Art. 73), we must find that for every solution of the equations there given, three corresponding solutions may be obtained by exactly reversing the values of s'_3 and p'_3 together with the values of one or both pairs of symbols s_1, p_1 and s_2, p_2 in such a manner that those which $= u$ should $= d$, and *vice versâ*. But it was shewn in Art. 74, that in the first figure the values of s_1 and p_2 are determined by the equations (1), (2), and (3), and consequently neither of the pairs of symbols s_1, p_1 or s_2, p_2 can have their values reversed in that figure. In the second figure we find the symbol p'_3 determined by the equations (1) and (2), and in the third figure the symbol s'_3 determined by the equations (1), (3), and (4), and consequently the changes of values cannot take place in these two figures any more than in the first. Again, it appears from the equations to the fourth figure, that

when s_1 can change its value, p_1 is determined, and when s_2 can change its value, p_2 is determined, and consequently in neither case can one of the pairs s_1, p_1 or s_2, p_2 both change their values simultaneously. Hence it follows that the conclusions at which we have arrived are all false, and consequently that the hypothesis which we assumed must be false also; and that true conclusions may be deduced from false premises in every figure of categorical syllogism.

FORMAL LOGIC.

BOOK II.

SECTION I.

LIMITATIONS UPON THE FORM OF JUDGMENTS, &c.

(77.) In the present section, it is proposed to trace the limitations upon the form of judgments, the superiority of the first figure of categorical syllogism, and the possibility of true conclusions from false premises, to a common *à priori* ground in the very constitution of the understanding itself. The ground in question is a simple property of the understanding-conception, Substance, and may be stated as follows. Substance, or the substratum of phenomena, (*i.e.* the thing that is,—but is not phenomenon,) can never become a predicate.

For the conception of Substance may be defined as that which is thought as remaining when all possible predicates have been ab-

stracted from it. It is therefore impossible to make it a predicate, for nothing is left which can become its subject; and were we to attempt to predicate it of phenomena, we must previously think a substratum for these phenomena, and should therefore only be predicating the simple conception-substance of itself, which is absurd.*

Law between the predicate and copula of categorical propositions.

(78.) This property of the understanding-conception, Substance, will immediately explain the reason of the law between the predicate and copula of categorical propositions. This law,

* It is necessary to put the reader on his guard against a certain species of categorical judgments which appear to militate against the observations in the text, and to contain the conception of substance in the predicate as well as subject. The predicate in these judgments contains matter of such a nature as to determine it to a particular object, *e. g.* 'that man travelled with me yesterday.' In this judgment, taken alone, I really only think of the existing man before me, and predicate of him all that is contained in my conception of his having travelled with me yesterday. But the instant after making such a judgment as this, I might very probably convert it in my own mind, and think first of the existing man with whom I travelled yesterday, and afterwards predicate of him that he then stood before me. And the case with which the understanding can thus at pleasure make either term a subject containing the conception of substance, very naturally produces a false semblance of that conception being in the predicate.

which has already been stated in Art. 33, is repeated here :—

Affirmative copulas have undistributed predicates ; negative copulas have distributed predicates.

For, inasmuch as the predicate cannot contain the conception of substance, it is not thought in respect of its sphere, or the things that are contained under it, but in respect of its matter, or the representations contained in it. This term is accordingly a mere conception, which is never formally determined as to its quantity, and the precise limits of its sphere must always remain unknown. The limits of the sphere of the subject cannot, therefore, be exactly compared with those of the sphere of the predicate, but the former term must either be placed wholly in or wholly out of the latter. If it is placed wholly in, it is compared with only a part of the sphere of the predicate ; if it is placed wholly out, it is compared with the whole. From these considerations it is immediately evident, that the quantity of the predicate is always undistributed in affirmative, and distributed in negative judgments.

There is no formal proposition of identity.

(79.) For if the subject is single, it evidently cannot be identical with the predicate which is a conception. But if the subject is a conception, it must be considered either as to its partial representations, *i. e.* what is thought in it, or else as to its sphere, *i. e.* what is thought under it. In the first case the conception in the subject must be literally the same as the conception in the predicate, and the result would be a tautology, but not a judgment: in the second case the subject, which refers to the sphere or aggregate of individuals, cannot of course be identical with the predicated conception, the quantum of whose sphere is formally indeterminate. In neither case therefore could there be a formal proposition of identity. It need hardly be observed, that in the proposition 'A is identical with B,' the identity is expressed in the matter, and not in the form.

Figures of Categorical Syllogism.

(80.) The great advantages in elegance and perspicuity that the first possesses over the other three figures, have been already mentioned in the first book; and the ground of this superiority may now be derived from the

considerations introduced at the commencement of this section.

It has been shewn in Art. 77, that the conception substance is never placed in the predicate of a categorical proposition. Hence a conception, which in the subject is considered as to its sphere, (or the aggregate of individuals that are contained under it,) in the predicate is considered as to its contents, (or the representation that is contained in it as a mere conception). Any change then in the situation of a term introduces the necessity of a change in the manner in which it is thought. Now in the first figure, both subject and predicate of the conclusion retain the same position which they held in the premises, and consequently no such change in the manner of thinking them is necessary. But in the second figure, the major term changes its place from subject in the major premiss to predicate in the conclusion; and in the third figure the minor term changes its place from predicate in the minor premiss to subject in the conclusion, and consequently a change takes place in the manner of thinking one extreme in each of these figures. Again, in the fourth figure neither of the extremes hold the same position in the conclusion which they hold in the premises, and consequently two changes in the

nature of the terms take place. In this manner, then, it is sufficiently easy to account for the superiority of the first, and inferiority of the fourth, to all the other figures. For all but the first involve the necessity of some change in the manner of our thinking one at least of the extremes; and the fourth involves two such changes. If the reader will make the experiment of different moods in different figures, he will become immediately conscious that their comparative merits entirely depend on the cause alleged. Perhaps the mood E I O is the fittest for the experiment, as it is sound in all figures.

True Conclusions from False Premises.

(81.) True conclusions may be logically deduced from false premises in every correct form of categorical syllogism.

This proposition has been formally demonstrated in the first book, by means of the symbolical expression of the syllogistic laws.

The following is another rather preferable proof, which could not with propriety have been introduced there, as it rests upon certain considerations from Transcendental Logic.

As no categorical proposition is either formally identical, or formally exhaustive, (which

latter form would really be negatively identical, since it would assert the identity of $\overline{\text{not B}}$ with A,) it follows that no categorical proposition completely determines the whole of one term with respect to the whole of the other. For instance, in the proposition 'No A is B,' each term is placed in the external sphere of the other, but whereabouts in it, is quite undetermined. Again, in the proposition 'All A is B,' B is a conception, the excess of whose sphere above that of A is also undetermined, as it may vary from nothing to infinity. Now the indeterminate parts of the premises can never be introduced in the conclusion, which must follow from them necessarily, and therefore depend on the determinate alone. Hence it is evident that the materially necessary parts of the premises are invariably less than those which are formally necessary. If then we suppose an error in the indeterminate, and therefore unavailable parts of the premises, they will of course be false, although the conclusion, which is materially dependent on the remaining parts of those premises, is itself true.

It ought to be, if it is not, an axiom in an *à priori* science, that the general proof should invariably precede all reference to particular examples. But the reasoning in the last paragraph may now be elucidated, by taking as an

example the mood A A A. The general form of a syllogism in this mood is the following:

All B is A,
All C is B,
Therefore All C is A.

In this syllogism, the indeterminate parts of the terms are the excess of A above B, and of B above C, and these parts are accordingly unavailable in the conclusion. For it is only so far as C agrees with B, that it agrees with what B agrees; and in the same manner it is only so far as B agrees with A, that C, which agrees with B, can be concluded to agree with A. Let us then assume an error in the comparison of that part of B, which exceeds C, with A. Still A will be predicated of so much B as agrees with C, and consequently the conclusion will be true, though the major premiss is false.

The following is an example of a sound syllogism, of the form A A A in the first figure, in which the major premiss is false, though the conclusion is true:—

'All animals are quadrupeds,'
'All horses are animals,'
Therefore 'All horses are quadrupeds.'

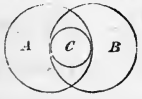
We subjoin three diagrams of this form of syllogism, in which the conclusion is true, though one or both premises are false. In

Fig. 1, both premises are false; in Fig. 2, the major premiss is false; and in Fig. 3, the minor premiss is false.

Fig. 1.

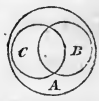
False, 'All B is A.'
False, 'All C is B.'
True, 'All C is A.'

Fig. 2.



False, 'All B is A.'
True, 'All C is B.'
True, 'All C is A.'

Fig. 3.



True, 'All B is A.'
False, 'All C is B.'
True, 'All C is A.'

These diagrams will also represent many other forms of syllogism, in which the conclusion is true, though one or both premises are false. For instance, if A be taken as the middle term, B as the major, and C the minor, Fig. 1 will represent the mood A E E in the second figure with a true conclusion, though both its premises are false. Again, if C be taken as middle term, A as major, and B as minor, Fig. 2 will represent the mood E I O in the first figure having its conclusion and minor premiss true, but its major premiss false. And similarly a great many other cases might be adduced, to which the above diagrams would be equally applicable.

This manner of proof may easily be extended to the other forms of syllogism. For instance,

in the hypothetical syllogism the antecedent contains the grounds of the truth of the consequent; but as it may also contain much more, their exact limits cannot be determined. The truth therefore of the consequent will be only formally, and not materially dependent on some part of the antecedent; and if an error is introduced in the minor premiss of a syllogism in the modus ponens, and in that part of it which does not constitute one of the grounds of the consequent, the result will be a true conclusion, though one of the premises is false: *e. g.* 'If the whole of the —— regiment were going to Canada, Captain A. would go; but the whole of the —— regiment are going to Canada; therefore Captain A. will go.' Now the antecedent contains all the necessary grounds for the truth of the consequent, and a great deal more besides; and consequently our minor premiss, which states that the whole regiment is going, might be false, and yet the conclusion that 'Captain A. is going' true.

As the conclusion must always be true if the premises are true, and will sometimes be true when they are false, it follows that the probability of the truth of the conclusion must always be rather greater than the probability of the truth of the premises.

Conclusions of the Reason.

(82.) The limitation which the understanding imposes upon the actual use of the reason, is very well calculated to place in a clear and strong light the distinct functions of the two faculties in every categorical syllogism; it is therefore briefly re-considered here.

The reason can deduce a conclusion from premises of the form I O in the first figure, by precisely the same mental operation as from the premises A A, or premises of any other legitimate form. These propositions are of the form

'Some B is A;
'Some C is not B:'

from which the conclusion may be logically deduced, that 'Some C is not some A.'

But this conclusion, though derived by the same function of the reason as any other legitimate conclusion (*i. e.* by a conjunction in the consciousness of two acts of the understanding), is nevertheless absolutely worthless, as it may be predicated *à priori* of any objects of which the understanding can think. For whatever be the nature of the hypothesis respecting the relation of C and A, (*e. g.* let 'All C be identical with all A,') still will it be true that 'Some C is not some

A.' And here therefore we find the logical reason performing its regular office in complete blindness, and quite independently of the nature of the result when considered in reference to the understanding.

SECTION II.

MODALITY OF SYLLOGISM.

(83.) Modality has been already defined as the determination of a judgment in respect of its relation to truth. If the matter of the judgment is merely in accordance with the *à priori* laws of thinking, the judgment is, in respect of its modality, problematical, or of the lowest degree: if it is in accordance not only with those laws, but also with the matter of the senses, it is assertive, or of the second degree; but if one of these *à priori* laws becomes the matter of the judgment, the latter is, in respect of its modality, necessary, or of the highest degree.*

As the formal use of the reason is quite independent of the matter of judgments, which at the same time determines their modality, it follows that this point of judging cannot have any influence on the nature of the conclusion in respect of its categorical form. But this remark does not extend to the modality of

* Vide Arts. 25, 26, on this subject.

the conclusion, which may in some measure be determined by that of the premises, and the extent to which one is a criterion of the other will supply the topic of the present section.

(84.) In order to place this subject in as clear a light as possible, it will be necessary to say a few words on the different sides from which the modality of a conclusion may be viewed. And in the first place, great care must be taken never to confound the modality of this proposition, 'that such a conclusion follows from such premises,' with the modality of the conclusion considered merely as to its own matter, and quite independently of its grounds.

The former modality is always of the highest degree, as it constitutes the very essence of a conclusion that it follows necessarily from its premises; whereas the real modality of the conclusion depends on the peculiar nature of its matter, and is determinable in the same manner as that of any other judgment.

But this distinction will become more apparent, when the above proposition assumes its appropriate form of a hypothetical, in which the conclusion is the consequent, and the premises the antecedent. It may then be stated thus: If such and such premises are both true, it will follow that such a conclusion is true. Now the relation between these

judgments is unquestionably necessary, as it consists in those laws of the reason by which the syllogism is known to be a correct one; but this is no criterion whatever for the modality of the judgments themselves, which constitute the matter of the hypothetical, and are therefore only propounded problematically. Before proceeding any further, an example will throw some light upon the foregoing remarks.

'All men are liars;'
'Obadiah is a man;'
Therefore 'Obadiah is a liar.'

Now the modality of this conclusion, considered in reference to the premises, is of the highest degree, or necessary; for the proposition that 'Obadiah is a liar' follows necessarily from the two propositions that 'all men are liars,' and that 'Obadiah is a man.' But the modality of this conclusion considered by itself is by no means necessary, since no necessity is contained in the proposition that 'Obadiah is a liar,' for no contradiction is involved in the supposition that he always tells the truth.

As we shall have occasion to recur to these two views of the modality of a conclusion, we shall designate them by the terms 'proper,' or that of any judgment considered merely as to

its own nature, and 'consequential,' or that which depends on its reference to the judgments from which it is deduced.

(85.) The proper modality of a conclusion cannot be fully determined by that of the premises, for the modality of the premises depends on their matter, and therefore on the middle term which occurs in each of them. But the conclusion will be unaffected as to matter, and therefore as to modality, by any change in the matter of the middle term, provided its formal quantity is preserved. Hence it follows that a change is possible in the modality of the premises, while that of the conclusion remains the same, and therefore that the modality of the one can never be fully determined by that of the other. This will appear from the following example. Let the two premises be

'All animals are organic beings;'

'All horses are animals.'

These propositions are analytical, and therefore necessary; and the conclusion derived from them, that 'All horses are organic beings,' is also analytical and necessary. But provided the formal quantity of the middle term 'animals, be retained in each premiss, any other matter may be substituted for it without affecting the legitimacy of the reasoning. Thus let the term 'cows' be substituted for

the middle term 'animals,' 'All cows are organic beings; all horses are cows; therefore all horses are organic beings.' Now the same conclusion has been logically deduced from these as from the original premises, and consequently its modality is the same in each case. But in the former syllogism the modality of both the premises was necessary; whereas in the latter, one of them is so far from being necessary that it is not even true. Hence it is evident that the nature of the premises can never be a complete criterion for the proper modality of the conclusion. There is, however, one law which will enable us to arrive at some sure knowledge on this subject, and may be stated thus: The modality of the conclusion is never of a lower degree than the lowest in either premiss.

(86.) Previous, however, to the consideration of this law, it will be necessary to shew why the case of two problematical judgments must be entirely put out of the question: for two judgments of this modality always leave the possibility of such a disjunctive relation existing between them, that they are never assertively true simultaneously.* No conclusion,

* It is necessary to distinguish between events that are 'simultaneously possible,' and 'possible simultaneously.' The first signifies that 'each is at the same time possible to happen;' the

therefore, can be deduced from them: but the truth of this remark will become more evident by an example. Let us suppose that a box contains only black and white balls, of which I abstract several, and put them in a bag without observing their colour: I may then state as problematical judgments—

'All the balls in the bag may be white; several black balls may be in the bag.' But I cannot deduce from these judgments even the problematical conclusion that 'several black balls may be white,' although such a syllogism in respect of its mere rational form (*i. e.* A I I in the first figure) would be perfectly legitimate. It is evident in this example that a disjunctive relation exists between the two premises, and consequently that they can never be true simultaneously, though either may be true when taken alone. As however the assertive modality of either premiss would destroy the possibility of such a relation, the objection will only apply to those cases in which both are problematical.

other, that 'both may possibly happen at the same time.' If I put my hand into a bag and draw out only one ball, I may draw out either a black one or a white one, and these events are therefore simultaneously possible. But as one ball cannot be both a black ball and a white ball too, these events are not possible simultaneously. The judgments in the example in the text, and also in every disjunctive proposition, are simultaneously possible, but not possible simultaneously.

(87.) After the exclusion of this particular combination of premises, five others will remain to which no such objection can be offered. These will accordingly come under the law, that the modality of the conclusion is never of a lower degree than that in the weakest* premiss.

To attempt a strict *demonstration* of any law respecting the operations of the Reason, involves the absurdity of making that faculty both judge and defendant in its own case: for in every proof the reason must tacitly assume the validity of its own laws, and any pretended demonstration of them from themselves is open to the objection of reasoning in a circle. It is useless therefore to sue the reason in its own court. All that can be done in a question respecting its functions, is to place it in as axiomatic a light as possible, and admit as final the decision of the faculty itself. In the present instance it is perhaps sufficient to observe, that inasmuch as the connection between the major and minor terms in the conclusion is entirely dependent on their previous comparison with the middle term in their respective premises, this connection must be of at least as high a degree as

* By the term 'weakest' that premiss is intended, whose modality is of at least as low a degree as that of the other premiss.

the lowest between the middle term and either extreme. And the same reasoning will also make evident the impossibility of logically deducing from the premises a higher degree of modality for the conclusion,* though such may perhaps exist. It will therefore be necessary to introduce the distinction of 'proper' and 'derived' modality, for the purpose of avoiding those long periphrases which would otherwise be perpetually recurring.

(88.) Perhaps the only great logical error of which Aristotle is guilty in his Analytics, refers to this very point of the modality of syllogism; and as an exposure of the fallacy will supply the best explanation of the last few paragraphs, we shall briefly consider it here.

The following passage will be found in the ninth chapter of the first book of the Former Analytics:—

Συμβαίνει δέ ποτε καὶ τῆς ἑτέρας προτάσεως ἀναγκαίας οὔσης ἀναγκαῖον γίνεσθαι τὸν συλλόγισμόν, πλὴν οὐχ ὁποτέρας τυχεν, ἀλλὰ τῆς πρὸς τὸ μεῖζον ἄκρον, οἷον εἰ τὸ μὲν Α τῷ Β ἐξ ἀνάγκης εἴληπται ὑπάρχον ἢ μὴ ὑπάρχον, τὸ δὲ Β τῷ Γ ὑπάρχον μόνον οὕτως γὰρ εἰλημμένων τῶν προτάσεων ἐξ ἀνάγκης τὸ Α τῷ Γ ὑπάρξει ἢ οὐχ ὑπάρξει. Επεὶ γὰρ παντὶ τῷ Β ἐξ ἀνάγκης ὑπάρχει ἢ οὐχ ὑπάρχει τὸ Α, τὸ δὲ Γ τι τῶν Β ἐστί, φανερὸν ὅτι καὶ τὸ Γ ἐξ ἀνάγκης ἔσται θάτερον τούτων.

* This law is precisely analogous to the mechanical axiom that every chain is of the same strength as its weakest link.

(*Translation.*)—It happens in some cases that if one premiss is necessary the syllogism becomes necessary (*i. e.* the conclusion of the syllogism), not however either premiss at random, but that which involves the major extreme; just as if, for instance, B is assumed to be A or not A, of necessity, and C is assumed merely to be B (*i. e.* assertively, not necessarily); for the premises being thus assumed, C will be A, or will not be A, of necessity. For since 'All B is A, or is not A,' of necessity, and 'C is a part of B,' it is evident that C will be one of these things (*i. e.* 'A or not A') of necessity.

Now as merely assertive judgments can only have empirical grounds for their truth, it follows that their predicates are stated of the sphere or individuals contained under the conception of the subject, and not of the conception itself. For a conception can only be predicated of another conception, (prior at least to the empirical consideration of the sphere of the latter,) either by being a superior conception, in which case the judgment is analytical, or else by some *à priori* law; but in either case the judgment is necessary, and therefore more than merely assertive.

Now, by the hypothesis, the minor premiss in the above syllogism is assertive, and consequently the middle term B is only predicated

of the minor term C in respect of its sphere, and not of its matter. But the truth of the conclusion (considered as such) depends entirely on this minor premiss, and in that judgment, therefore, A must be predicated of C in respect of its sphere and not its matter. But when a conception is predicated only of the sphere of another, the judgment cannot be necessary, as it involves no *à priori* law of thinking, and conveys no certainty that an exception may not be found on some future occasion. Hence the derived modality of the conclusion that 'all C is A, or is not A,' can never exceed the assertive or second degree, which is that of the weakest premiss. Let us take the following example:

'All members of Caius College are members of the University. Several Norfolk men are members of Caius College. Therefore several Norfolk men are members of the University.'

Now the major premiss of this syllogism is analytical, and therefore necessary, for it constitutes a part of the conception of a member of a college that he should be a member of the University. But the minor premiss on the contrary is merely assertive, as it is by no means necessary to our conception of Norfolk men that several of them should be members of Caius College. And the conclusion is also

merely assertive, as it does not necessarily enter into our conception of Norfolk men that they must be members of the University.

It is evident from this example, that only an assertive conclusion can be deduced from a necessary major and an assertive minor premiss. But this law regards the derived modality alone, and leaves the proper modality quite undetermined. For a trifling alteration in the example just given will render the proper modality of the conclusion necessary, and leave that of the premises unaltered. Let the minor term be changed into 'Several members of the University who reside in Norfolk;' the minor premiss will still be only assertive, as it is not necessary that any one of these men should be a member of Caius College; but the conclusion will be analytical, and therefore its proper modality will be necessary.

But, that Aristotle never intended to say that the conclusion from premises so assumed might sometimes* be necessary in its own nature, and sometimes only assertive, appears from his giving this proof in the general symbols A, B, C; and also from his predi-

* The restriction contained in the word ποτε, evidently alludes to the limitation of the law to those cases in which the major premiss is necessary, and the minor assertive.

cating necessity of the syllogism, and not merely of the conclusion. Neither is he merely alluding to the consequential modality of the conclusion, for he distinguishes between the proper and consequential modalities more than once, and particularly in the middle of the following chapter. So that his evident meaning is this: if a necessary major premiss and an assertive minor premiss be assumed in the first figure, that modality which can be derived from that of the premises for the conclusion as a judgment considered by itself, will be necessary and not merely assertive.

(89.) A fallacy involving a breach of the same law is to be found at the commencement of the nineteenth chapter of the first book of the Former Analytics.* Aristotle here lays down as a general rule, that if one premiss is necessary and negative, and the other problematical and affirmative, an assertive conclusion may be deduced from them.

"For let 'All B be necessarily not A,' and 'All C be possibly A:' if the negative premiss is converted, 'All A will be necessarily not B;' but 'All C may possibly be A;' there will therefore be a syllogism in the first figure to the effect that 'All C is possibly not B.' But

* This passage is at page 97 of Bekker's 8vo. Edition, Oxford reprint: Ἐι δ' ἡ μὲν ἐξ ἀνάγκης —— τεθείη τὸ στερητικόν.

it is evident, moreover, that 'All C will *be* not B.' For let us assume that 'Some C *is* B:' if then 'All B is necessarily not A,' and 'Some C is B,' it follows that 'Some C cannot be A,' which is absurd, as by the original hypothesis, 'All C may be A.' Therefore, &c."

This reasoning is extremely ingenious, but not less sophistical. It will be found to hinge upon the very fallacy which has just been exposed in the last paragraph. For the conclusion which Aristotle wishes to deduce, is assertive, viz. 'All A *is* B:' he accordingly assumes the assertive contradictory of this conclusion as the minor premiss of the first syllogism in an indirect proof, and from this assertive minor, and the original necessary major premiss, fallaciously deduces a necessary conclusion, to the effect that, 'Some C cannot be A.' And as this conclusion is at variance with the other premiss that 'All C may be A,' he infers that his assumption of the contradictory of the proposition 'All A is B' was unwarranted, and therefore concludes that 'All A is B.' Now the necessity of the conclusion that 'Some C cannot be A' was merely consequential and not proper, and the legitimate conclusion that 'Some C is not A' is not at all opposed to the original minor premiss that 'All C is possibly A.' For this, as well as

every other problematical conclusion, contains the conception of the possibility of the contrary. The proposition 'All C is possibly A' is therefore perfectly compatible with the proposition that 'Some C is possibly not A.' And it must be observed that the assertive modality of the conclusion that 'Some C is not A,' arises from the assumption of the assertive premiss that 'Some C is B,' which latter proposition states more than the premises would warrant in the conclusion of the original syllogism, though it is by no means contradictory to it. We will bring the question to an *experimentum crucis,* which will render the fallacy immediately evident. This will be most readily effected by taking a particular example, and carrying out the whole argument in precisely the same form as that in which it is given by Aristotle.

Let a bag contain several balls whose colour is unknown, and may therefore possibly be white or black, or any other colour. The necessary and negative premiss may then be, 'No white balls are black balls,' and the problematical affirmative, 'All the balls in the bag may be white balls;' from which Aristotle's reasoning would deduce as conclusion, that 'none of the balls in the bag *are* black balls.' His proof would run as follows: 'Let some of the

balls in the bag be black balls; as no black balls can be white balls, it follows that some of the balls in the bag cannot be white balls. But this is absurd, for by the hypothesis all the balls in the bag may be white. Therefore, &c.'

This species of fallacy will become yet more apparent by stripping it of the syllogism with which it is connected, and proving by its means that every judgment which is true problematically, must also be true assertively. Let the judgment be, 'All A may possibly be B.' It will follow from this that 'All A is B.' For if it is false that 'All A is B,' it must necessarily be true that 'Some A is not B.' But this is absurd, as by the hypothesis 'All A may be B.' Hence it follows, that the assumed falsity of the proposition 'All A is B,' must itself be false, and therefore that 'All A is B.'

Both of these fallacies of Aristotle are of considerable importance, as they violate this fundamental principle of the modality of syllogism, namely, that the derived modality of the conclusion is the same as that of the weakest premiss.

(90.) There is however another fallacy, very near the end of the twenty-eighth chapter of the same book, which is introduced here rather

as a curiosity than for any other reason, as in all probability it is the only instance of a false mood and figure in the whole work. It is stated in this passage that the denying B of H is exactly equivalent to identifying B with some T, where T has been previously assumed to represent the whole external sphere of a certain term E, which is itself a predicate of H. This paralogism is of the form A E E in the first figure, which has an illicit major, or E A E in the fourth figure, which has an illicit minor.*

It is rather remarkable, that, notwithstanding Aristotle's entire rejection of the fourth figure, he has introduced it once in this very chapter, in the mood A A I.†

* Page 115, Τὸ γὰρ μὴ ἐνδέχσθαι τὸ B, κ. τ. λ.

† Page 112, Εἰ δὲ τῷ H τὸ B ταὐτόν, κ. τ. λ.

APPENDIX.

The following are a few examples in which the reader can try his skill in detecting fallacies, determining the peculiar form of syllogisms, and supplying the suppressed premises of enthymemes. The arguments alone have been adopted from the different authors whose names are attached, as alterations in the mode of expressing them have invariably been found necessary to bring them a little nearer the simple syllogistic forms. Several of the examples contain more than one syllogism.

(1.) None but those who are contented with their lot in life can justly be considered happy. But the truly wise man will always make himself contented with his lot in life, and therefore he may justly be considered happy.

(2.) All nations, whose commerce has been very extensive, have reached a great height in refinement and luxury. The Romans reached a great height in refinement and luxury. Therefore the Romans must have had a very extensive commerce.

(3.) A really terrible enemy would never excite so small a degree of fear that any other passion could master the feeling. But there is no passion so weak that it cannot master the fear of death. Therefore death is no very terrible enemy.—*Bacon.*

(4.) None but the contented are happy; the good are happy; therefore they are contented.

(5.) If there is a possibility of the existence of God, nothing can be more evident than that men ought to live virtuously and piously, and that vice is the most absurd thing in nature. But that God exists is perfectly possible, as no demonstration can be given of the contrary. Therefore men ought to live virtuously and piously, and vice is the most absurd thing in nature.—*Clarke.*

(6.) If all cats are animals, and all animals are organic beings, it follows that all cats are organic beings. But all cats are organic beings. Therefore all cats are animals, and all animals are organic beings.

(7.) A statesman should particularly avoid anything that tends to bring him into contempt. Idle and frivolous duels will probably have this effect, and he should therefore particularly avoid them. — *Taylor's Statesman.*

(8.) All intelligible propositions must be either true or false. The two propositions 'Cæsar is living still,' and 'Cæsar is dead,' are both intelligible propositions; therefore they are both true, or both false.

(9.) God acts according to laws because he knows them, he knows them because he has made them, he has made them because they bear a certain relation to his wisdom and power; therefore God acts according to

laws because they bear a certain relation to his wisdom and power.—*Montesquieu.*

(10.) Blessed are the pure in heart, for they shall see God.

(11.) None but the good are really great, and all the good are happy. The slaves of passion are never really great, and therefore they are never happy.

(12.) No man who is in London can be in York. As no person has told me where Mr. A is, for all I know to the contrary he may be in York. Therefore I conclude that he is not in London. For if this conclusion is false, it must be true that he is in London. But no man that is in London can be in York. Therefore Mr. A is not in York, which is contrary to the original hypothesis that he may be in York; and therefore the second hypothesis, that he is in London, must be false, and Mr. A is not in London.

(13.) All God's gifts are intended for use. Our foresight and power over the future are God's gifts. Therefore it is intended that we should use our foresight and power over the future. But Slavery precludes all possibility of the exercise of these powers; it is therefore opposed to the intentions of Providence —*Channing.*

(14.) Many things are more difficult than to do nothing. Nothing is more difficult to do than to walk on one's head. Therefore many things are more difficult than to walk on one's head.

(15.) If God does not grant his grace upon the same conditions to all mankind, he is a respecter of persons. But God is no respecter of persons. There-

fore God grants his grace upon the same conditions to all mankind.

(16.) He that is of God heareth God's words: ye therefore hear them not, because ye are not of God. —*John*, c. viii, v. 47. *Quoted from Whately's Logic.*

(17.) It is highly probable that all persons who have established a new religion entirely subversive of the old, have suffered persecution. The first preachers of Christianity were such persons. It is therefore highly probable that they suffered persecution. — *Paley's Evidences.*

(18.) The men who barter their eternal welfare for temporary gratifications are very deficient in real wisdom. But the men who are thus deficient are by no means few. Therefore the men who barter their eternal welfare for temporary gratifications are by no means few.

(19.) None but Whigs vote for Mr. B. All who vote for Mr B. are ten-pound householders. Therefore none but Whigs are ten-pound householders.

(20.) The waking state succeeds the sleeping, and the sleeping succeeds the waking; things become cold from having been hot, and hot from having been cold; men can only become taller from having been shorter, and shorter from having been taller. Thus all contraries mutually produce, and are produced from, each other. But the states of life and death are contrary to each other. Therefore the state of life succeeds that of death, as that of death does that of life.—*Plato's Phædo.*

(21.) If the Mosaic account of the cosmogony is strictly correct, the sun was not created till the fourth day. And if the sun was not created till the fourth day, it could not have been the cause of the alternation of day

and night for the first three days. But either the word 'day' is used in Scripture in a different sense to that in which it is commonly accepted now, or else the sun must have been the cause of the alternation of day and night for the first three days. Hence it follows that either the Mosaic account of the cosmogony is not strictly correct, or else the word 'day' is used in Scripture in a different sense to that in which it is commonly accepted now.

(22.) Men who would peril their own lives and those of their fellow-creatures on no better pretext than that of maintaining a reputation for courage, would unquestionably engage in duels upon very slight provocation. But none except very weak men would ever peril any human life with such an object alone, and we therefore conclude that none but very weak men would engage in duels upon very slight provocation.

(23.) Laws, in the widest acceptation of the word, are the necessary relations which derive their origin from the nature of things. The Deity, therefore, has his laws, for he bears a certain relation to the universe as its creator and preserver.—*Montesquieu.*

(24.) Suffering is a title to an excellent inheritance; for God chastens every son whom he receives. (Quoted literally from Jeremy Taylor's Holy Living and Dying.) This sentence may be put under the following form: All whom God receives, he chastens; all who suffer, God chastens; therefore, all who suffer, God receives.

(25.) To do a certain evil for a problematical good is contrary to the spirit of Christianity. But to hurry a great criminal into the presence of his Creator, and this for the sake of the very questionable advantage which

capital may have over other severe punishments in deterring others from crime, is to do a certain evil for a problematical good. Therefore capital punishment is contrary to the spirit of Christianity.

ADDITION TO NOTE p. 117.

The complete elimination of the indeterminate symbols x, y, m, n from the equations on note to p. 117, will furnish additional equations representing the general laws of Categorical Syllogism in their simplest form: each of whose solutions will correspond to a possible mood.

It is unnecessary to insert the process of elimination; but it will be seen without difficulty that the equations thus obtained are the following:—

Quality..... $p_1 + p_2 + p'_3 = d + 2u$.....(1).

Laws of particular premises and particular conclusion. $\left.\begin{matrix}(s_1 - d)(s_2 - d) = 0 \\ (s_1 - d)(s'_3 - d) = 0 \\ (s_2 - d)(s'_3 - d) = 0\end{matrix}\right\}$..... (2).

I E O excluded as leading to illicit major. $\left\{(s_1 - d)(p_1 - d)(p'_3 - d) = 0\right.$...(3).

(1.) Implies that two of the quantities $p_1\, p_2\, p'_3$ must be $= u$, and a third $= d$, and admits therefore of 3 solutions.

(2.) Imply that any two or all three of the quantities $s_1\, s_2\, s'_3$ must $= d$ . . and admit therefore of 4 solutions.

The whole number of solutions therefore admissible from (1) and (2) is $3 \times 4 = 12$.

Of these one is rendered inadmissible by (3). The whole number of possible moods is therefore 11.

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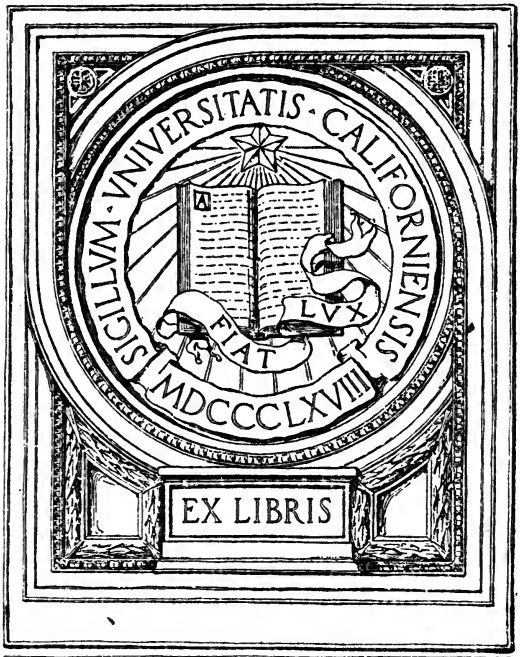

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A SHORT INTRODUCTION

TO THE

STUDY OF LOGIC.

BY

LAURENCE JOHNSTONE.

UNIVERSITY OF CALIFORNIA

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INTRODUCTION TO THE STUDY OF LOGIC.

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INTRODUCTION.

DEFINITION AND DIVISION OF LOGIC.

I. Logic, called by Whately "the science and art of reasoning," and by John Stuart Mill "the science of evidence or proof," is the science of the forms of thought," or "of those laws on which depends the truth of thought," and is defined by St. Thomas: "The science which teaches man how to order aright the acts of the intellect in the pursuit and acquirement of true science;" and again: "The science of the order to be followed in the acts of the intellect in the pursuit and demonstration of truth." Suarez says: "It is the proper office of Logic to give the means of acquiring true science,—which is done by showing what are its instruments, and by demonstrating their power and properties."

These words of Suarez, and the first three of the six definitions enumerated, apply, strictly speaking, only to Formal Logic, or Dialectics, of which we shall speak just now: so that the choice of a general definition is restricted to the two statements of St. Thomas and the definition immediately preceding them; while it is clear that choice is merely a matter of form, as all three express precisely the same thing.

II. In all of them three things are either expressed or implied, viz., **A**, an **Agent**; **B**, an **Act** according to some law or order; **C**, an **End**.

The Agent is **man**; the Act is **reasoning**; the End is **Truth**.

According to this view, the subject admits of the following division:

A. Man, as the **agent of the act** of reasoning;

B. Reasoning—**the act of the agent**;

C. Truth and certainty—**the end of the agent's act.**

This is only another way of putting the Scholastic division of Logic into **Formal** and **Material**; Formal Logic or Dialectics answering to the act of the agent (see definitions at p. 10, et seq., referred to at p. 17); Material Logic, to the end of the act. And, as Truth is something else besides the end of the act of reasoning, as it can be gained in other ways, and is manifested by laws outside our minds,—and as Material Logic has Truth for its matter, it follows that these laws must fall within the scope of this Material Logic. In this division a knowledge of the agent of the act is presupposed.

A distinction is often made between **Natural** and **Artificial** Logic, Natural Logic means the natural reasoning that leads men to Truth, or that would do so, if it were possible for them always to follow the light of reason. Artificial Logic may be briefly called the science of Natural Logic, for it does no more than give an exact and methodical shape to the rules delivered by nature; just as in music, or painting, or sculpture, the technicalities of the art merely throw natural rules into order and method.

And, as the art-student naturally acquires delicacy of perception in all that concerns his art; so does the study of Logic give delicacy of intellectual touch to distinguish Truth, and a peculiar power of discerning Truth, and of unmasking error when it lurks under the guise of Truth.

III. This being so, it is evident that, although the task of putting due order into the discourse of the mind is far more difficult than success in art or in science, it is nevertheless far more necessary; and that in science Logic is itself the "instrument of knowledge," and so must precede its acquisition, as St. Thomas says: "Necessity requires that, although it is more difficult than many other sciences, we should in learning begin with Logic, because all other sciences depend upon it,"[1] that is, they depend so far as our knowledge is concerned, on the accuracy of thought gained by Logic, and on the application of its rules to the matter of the science.

[1] Opusc. 70.

A.

THE AGENT.

THE AGENT.[1]

I. Definition of the Agent. II. Powers of the soul. III. Powers of the intellect. IV. Action of the intellect.

I. Definition. From the time of Aristotle, man has been defined "a rational animal;" he is a complete substance, composed of two incomplete substances—the body and the soul; the body being the **matter** of the substance, and the soul its **form.**[2] Hence it is said that the soul "informs" the body; and hence it is, through the action of its powers, the principle of man's life and activity. Created by God, and placed in the body to rule and direct it, the soul is the stable and permanent element in all the various processes of what we vaguely call our minds; and, being in itself a spiritual substance, is capable of existing and acting without the body, though in this life the two are inseparably united, and so closely that it is impossible for the one to act without the other being in some way, either directly or indirectly, affected.

II. Powers of the soul. Inherent in the soul,

[1] This brief sketch merely treats of what it is necessary to know of the mind of man, in order to study and understand Logic aright.

[2] See p. 75.

and producing by their action one or other of man's many vital processes, are three classes of powers or faculties:

1. **Vegetative powers**—nutrition, growth, generation—which belong to the soul in virtue of its connection with the body, and are common to plants, animals, and men.

2. **Sensitive powers**—*e.g.*, senses, imagination, instinct, sensitive memory—which also belong to the soul in virtue of its connection with the body: they are common to the animals and men.

3. **Rational powers**—memory (rational), intellect or understanding, and will—which belong to the soul itself, and in virtue of its own nature; hence to man as man.

III. **Intellect or Understanding** contains within it three powers, viz.:

1. **Conception,** the faculty by which we form ideas;

2. **Judgment,** the faculty by which we join together two ideas;

3. **Reasoning,** the faculty by which we compare and weigh judgments, and therefrom deduce conclusions.

IV. **Action of the Intellect.** By this term we can understand the processes of the three intellectual powers just enumerated; and thus the first thing to be considered under it will be the exercise of **Conception** in the **Formation of ideas.** The mind is a tabula rasa before it receives any impressions from without. It receives impressions, or the matter for ideas, through the senses, upon which the impression is made. By means of the "sensus

intimus" man becomes conscious of these impressions, of which the imagination then forms a picture or phantasm. Up to this point the cognition is merely a sensitive or sensible one, like that of animals. But, from the picture on the imagination, the intellect draws that element which is akin to itself, that is the immaterial incorporeal element, throws it into its mould—so to say—and the result is the "species intelligibilis," formed in the intellect itself, and representative of the exterior thing. When informed by the "species intelligibilis" of a thing, the intellect simply names that thing to itself with a mental word; and the mind is conscious of the possession of its idea. It must be borne in mind that the "species intelligibilis" is, like the intellect itself, purely spiritual and immaterial, and so is in no sense pictorially representative of the external object of sense, as is the phantasm of the imagination. For instance: the eye sees a fan-tail, and thus there arises an external sensation; the consciousness of this sensation obtained by the "sensus intimus," supplies the matter for the phantasm of the fan-tail, which is next formed in the imagination; and then in the intellect the "species intelligibilis," or spiritual representation of the fan-tail comes into being; whereupon the intellect, then by a simple word, says in and to itself, fan-tail. Again, a boy sees a triangle, of which he has first of all an external sensation, made conscious to him by the "sensus intimus"; anon a picture of the triangle paints itself on his imagination; from this picture or phantasm, which is probably a very imperfect representation of a triangle, his intellect

extracts an universal, perfect, "ideal" triangle, and on this he argues, and deduces from it all its properties.

Thus much for the idea, which, so far from being the lengthy matter this explanation would seem to imply, is practically an almost instantaneous process, and a simple indivisible act. Hence we say that, an idea flashes upon us in an instant.

The next thing to be looked at is **Judgment,** that is, the way two ideas are joined together. Having two or more "species intelligibiles," the intellect in putting them together produces a complex word or idea, called a judgment, or more popularly a statement: for in English the term judgment is often applied in common parlance to the conclusion or result of a train of reasoning, of which we shall speak next. To illustrate this complex word, or statement, or judgment, we will go back to our fan-tail. The intellect has the "species intelligibilis" of fan-tail, and of, say, tame and wild. From them it produces a complex word, saying, the fan-tail is tame, or the fan-tail is not wild; in the first statement affirming something by a positive "judgment"; in the second, denying something by a negative "judgment." And so, too, with the boy and his triangle. If he has the "species intelligibilis" of triangle and of scalene and isosceles, he may affirm by a positive judgment that the triangle is scalene; or deny something by the negative judgment that the triangle is not isosceles.

Lastly, the faculty of **Reasoning** comes into play. The intellect passes from one complex word or judgment to another, compares them, and either

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unites or separates them, and forms a new complex word or judgment, resulting from the comparison. For instance:

Every fish has fins;
But no fan-tail has fins;
Therefore no fan-tail is a fish.

When this new complex word or judgment, which is called the conclusion, is some truth which has no influence on our conduct, the faculty of Reasoning is called Speculative Reason. Instance the above comparison of fish, fins, and fan-tail; and again:

Secondary planets move round their primaries;
But the moon is a secondary planet;
Therefore the moon moves round its primary.

When the result of the argument is some action on our part, when we reason with a view to practice, the faculty is called the Practical Reason, and the process a practical one; *e.g.*, if I am led by the following argument to study the moon through a telescope, I exercise the Practical Reason:

Planets can only be satisfactorily studied through a telescope;
But the moon is a planet;
Therefore the moon can only be satisfactorily studied through a telescope,—and I must study it through a telescope.

And I employ the practical Reason when I argue that:

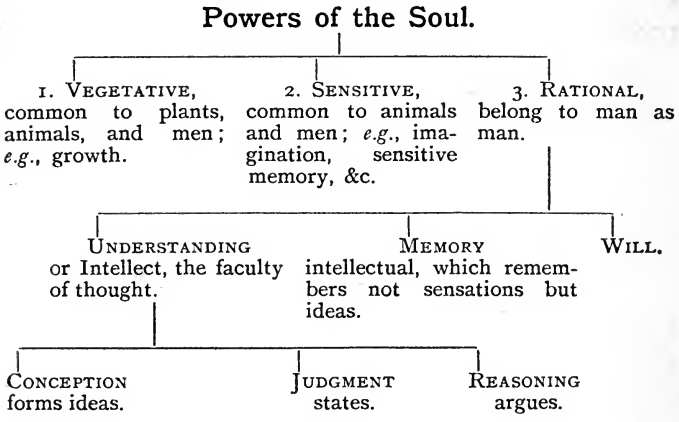
The means of advancing in my studies are to be adopted;
But steady conscientious application is a means of advancing in my studies;

Therefore steady conscientious application is a habit to be adopted or acquired,—and one which I will do my best to acquire.

Thus a Speculative Process differs from a Practical one, not in itself, but in respect of the end or object to which it is directed. The same faculty is employed in either case: the only difference is in the result aimed at.

All this internal discourse of the mind is called **Reasoning,** and its end is the clear knowledge of Truth. The order in which these acts of the intellect should be arranged is called the Logical or Rational Order: and so we come to Logic itself, or the **Act of the Agent,** or **Formal Logic.**

Before passing on to it, however, the matter just treated of may be made clearer by the subjoined scheme.


Powers of the Soul.
1. Vegetative, common to plants, animals, and men; *e.g.*, growth.
2. Sensitive, common to animals and men; *e.g.*, imagination, sensitive memory, &c.
3. Rational, belong to man as man.
Understanding or Intellect, the faculty of thought.
Memory intellectual, which remembers not sensations but ideas.
Will.
Conception forms ideas.
Judgment states.
Reasoning argues.

B.

THE ACT OF THE AGENT,

OR

FORMAL LOGIC.

CHAPTER I.

I. Definition of the act. II. Division of the act. III. Matter of the act. IV. Definition of terms. V. Division of terms.

I. Definition. See pp. 10—14.

II. Division. In the "Act of the Agent" there are two things to be considered, viz., its **Matter** and **Form.** Having seen what Logic is, and having besides looked at the intellect of man, which is the direct agent of Logic, we must conclude at once that the Matter of reasoning can be no other than those acts of the intellect which admit of being arranged suitably for the attainment of Truth, *i.e.*, ideas and statements or "judgments;" while the Form of Logic must be that disposition—or handling—of ideas and statements, by means of which the intellect attains its end of knowing Truth. We have already shown that this disposition or handling of ideas and statements, is that internal discourse of the mind which is called reasoning; and hence reasoning must be the Form of Logic.

III. Matter. As intellectual acts are more easily treated of by the use of signs, the word of the intellect or idea is known in Logic as a **Term,** and the complex word or "judgment" as a **Proposition.** Hence **Terms** and **Propositions** are the signs of the

matter of the "Act of the Agent," or of Formal Logic.

IV. Terms. Definition. Taken absolutely, a term is the external sign of what by a simple internal word has become the object of thought: thus fan-tail, tame, wild, virtue, triangle, scalene, isosceles, are terms.

Considered relatively, a term is defined by Aristotle "that into which every proposition[1] is resolved, as into subject and predicate," *e.g.*, our fan-tails—subject—are—interesting birds—predicate. Here the two terms are fan-tails and interesting birds, united by the verb are, which is neither a term nor part of a term, but the nexus or link joining one term to another.

V. Division of Terms. Terms have been divided into a number of classes, of which the following seem to be the chief. [It must be remembered that the various groups of classes, as they may be called, are strictly co-ordinate; and so it will be seen that the same term may often belong to many groups, though it can, of course, belong only to one class or subdivision of each group.]

(1.) Terms may be either **simple** or **complex.** They are simple when they consist only of one word, *e.g.*, man, house, triangle; complex when they consist of two or more words, or even of propositions, *e.g.*, tame fan-tail, bright blue sky, the fan-tails we fed, the house that Jack built.

(2.) A term may be **absolute** or **relative.** An absolute term denotes a thing in itself, *e.g.*, man, book, star; a relative term denotes a thing in rela-

[1] See p. 21.

tion to some other thing, *e.g.*, father, master, which denote man in relation to children or subordinates—satellite which denotes a secondary planet in relation to its primary. Terms so related are called **correlatives.**

(3.) Terms may be **abstract** or **concrete**; abstract, when they express a quality or attribute apart from the being of its object, *e.g.*, wisdom, folly, common-sense; concrete, when they express quality united with being, *e.g.*, man, wise, foolish, sensible.

(4.) Terms may be **singular** or **universal**; singular or individual terms are such as can be applied only to a single individual thing, *e.g.*, St. Thomas Aquinas, Aristotle, this ruler, this picture; universal or common terms are such as can be applied in the same sense to many things. Such application may be either:

(a.) **specific,** that which indicates the species of the thing to which it is applied, *e.g.*, the universal term man indicates that John or Thomas, to whom I apply it, is a rational animal.

(b.) **generic,** that which indicates the genus of a thing, or the wider division that is marked into classes by the species, *e.g.*, animal is the genus of man, scansores is the genus of parrot, wind is the genus of monsoon.

(c.) **differential,** that which distinguishes a particular species from all the other species under the same genus, *e.g.*, the universal term rational distinguishes man from all other species under the genus animal, the universal term hyperbolic distinguishes a certain species of orbit from all other species under the genus orbit.

(d.) **proper,** that which indicates something belonging to all the individuals of a species, as such, and applicable only to them, *e.g.*, reasoning is proper to man as such, and belongs only to man.

(e.) **accidental,** that which indicates something which, though not necessarily joined to the difference, is yet found in some individuals of the species, *e.g.*, black as applied to men, green to parrots, white to pigeons, red to roses.

Hence **genus, species, difference, property, accident, are all universals,** because many things do or can participate in them; they are also called **predicables,** because in every proposition that predicate which can be applied in the same sense to many things must be either genus, species, difference, property, or accident.

(5.) Lastly, terms may be **univocal, equivocal,** or **analogous,** which are not really three kinds of terms, but three ways of using them. A term is used **univocally** when it is applied to several objects in the same sense: thus boy is used univocally of John, Henry and James; and girl is used univocally of Edith, Margaret and Alice. A term is taken **equivocally** when it is used in several instances in quite distinct significations: thus the terms Jupiter and Mars are used equivocally of the heathen gods and the planets; and the term Great Eastern is used equivocally of a certain line of railway and a well known steamship. When a term is applied to two or more things in senses which are in some points identical and in some points different, the term is taken **analogically:** thus, according to **analogy of attribution,** which is found between

terms signifying things of different natures, yet all having a connection with some one thing, the term healthful may be applied to medicine, food, exercise, dwelling, and the like; while, according to **analogy of proportion**, which exists when a term is used in two quite distinct senses, standing nevertheless in similar relations to two other terms, we speak of the smile of a man, of fortune, of a meadow, or again of stormy weather, stormy tempers, stormy troubles. Analogy of proportion is what is commonly understood by analogy.

CHAPTER II.

VI. Definition of propositions. VII. Division of propositions. VIII. Properties of propositions.

VI. Propositions. Definition. A proposition is the verbal sign of the statement or, "judgment," or "complex word of the intellect," that is to say, it is the statement or judgment expressed in words, and hence Aristotle calls a proposition an **interpretation,** because it interprets the statement or judgment of the intellect. It may be closely defined as—a sentence in which one term is joined to another, or disjoined from it. The word term is used instead of things, because both terms may express the same thing, and because a proposition does not unite or separate things but the signs of things.

In examining propositions, it will be seen that, although terms and propositions are the matter of formal logic, propositions are the **direct** or **proxi-**

mate matter of reasoning or syllogisms, while terms are the **indirect** or **remote matter**; because, in point of fact, terms are the matter of propositions. They are so because propositions are made of terms formed into propositions by the verb *to be*, which, either explicitly or implicitly, is their nexus or copula, hence makes the proposition what it is, and hence is its **form**; *e.g.*, fan-tails are birds; fan-tails and birds are the two terms of the proposition, *i.e.*, its matter; the verb *are* is the nexus joining the two terms together, and making them into a proposition, *e.g.*, giving the proposition its form. The verb *to be* does this explicitly when it is expressed, as in the above proposition; it does it implicitly when, as in all non-explicit instances, it is implied in the verb used, *e.g.*, The fan-tails fly is logically equivalent to The fan-tails are flying; I came = I was coming; Fan-tails like petting = Fan-tails are liking petting.

VII. Division of Propositions. Like terms, propositions are divided into a number of classes, or co-ordinate group of classes. Of these the following are the chief:

(1.) Propositions may be either **simple** or **composite.** A simple proposition is one which contains only one subject and predicate, and cannot be resolved into other propositions, *e.g.*, This fan-tail is tame,—These colours are bright,—Delays are dangerous. Simple propositions are often called **categorical,** because they simply assert that the subject does, or does not agree with the predicate. A composite proposition is one which either implicitly or explicitly contains other propositions into which it may be resolved, *i.e.*, its subject or predicate

must be compound or composite as opposed to simple. Composite propositions may be:

(a.) Hypothetical or **conditional,** when something is affirmed or denied, not absolutely, but under some condition, *e.g.*, if the fan-tails are hungry, they will feed on my hand; If a heavenly body revolves round the sun, that heavenly body cannot be a fixed star; If man thinks, he must be rational. The truth of such propositions depends upon the **assertion** or **consequent** being a result of the **condition** or **antecedent,** hence upon the **nexus** between them.

(b.) Causal, when the predicate contains the reason of its union with the subject, *e.g.*, The fan-tails feed on my hand because they are hungry; Man thinks because he is rational; The earth is a planet because it revolves round the sun. The truth of such propositions depends upon the truth of the reason assigned, *e.g.*, the fan-tails might be in the habit of never feeding anywhere else but on my hand, whether they were hungry or not; and then it would not be true to say—the fan-tails feed on my hand because they are hungry, although they might be both hungry and feeding on my hand.

(c.) **Copulative,** when the proposition contains more than one subject, or more than one predicate, made into a single term by some negative or affirmative particle, *e.g.*, Both fan-tails and ringdoves have wings; Neither fan-tails nor ringdoves can fly very high; Plants live and grow; Animals and plants live; the drawing-master has brought some fine copies, both in crayons and water-colours. For these propositions are to be true; the single predicate

must apply to all the subjects, and the single subject must apply to all the predicates.

(d.) **Disjunctive,** when several subjects or predicates are included in a single term by a disjunctive particle, *i.e.*, one which implies an alternative, *e.g.*, I shall either come or go; The sun is either in motion or at rest; The soul is either a simple uncompounded substance, or a composite compounded substance. For such propositions to be true, one of the two or more predicates must apply to the subject; and, in the reverse case, one of the two or more subjects must apply to the predicate.

(2.) Propositions may be **singular, universal, particular,** or **indefinite**: singular, when the subject is a singular term, *e.g.*, Julius Cæsar was murdered in the senate house; The moon is in itself a dark body; Brutus is an honourable man; Thetis saved Hephaistos: universal, when the subject is a universal term, *e.g.*, all men are mortal; all the mythological personages of Homer fall into three groups; all the old Spanish comedies were of a thoroughly romantic character; All Downside boys remember Coxhead Sunday: particular when the predicate is either affirmed or denied of only part of the subject; in such cases the subject is called a particular term, *i.e.*, a universal taken with a limitation; *e.g.*, Some boys are troublesome; Some of the stories in the *Arabian Nights* are probably derived from Persian sources; Much modern philosophy is like a man having a hale and healthy look while the germs of fatal malady lie within him: indefinite, when nothing in the proposition shows whether the subject is used in a particular or in a universal sense,

e.g., Children are bright; Fan-tails are interesting; "The lunatic, the lover, and the poet, are of imagination all compact."

Practically, however, indefinite propositions are treated as universals when they either exclude all exceptions, *i.e.*, have **absolute universality**, *e.g.*, Man is a creature; Fan-tails are birds; or have universality in the **physical** order, *e.g.*, A dead tree cannot put forth green leaves; A dead man cannot return to life (*i.e.*, according to the ordinary laws of nature); —or have universality in the **moral** order, the exceptions to which depend on human freedom, *e.g.*, Mothers love their children; Countries are not liable to foreign invasion from civilized powers in time of peace.

(3.) Propositions may be **affirmative** or **negative;** affirmative when the predicate is affirmed of the subject, *e.g.*, Fan-tails are frolicsome; Man is a free agent;—A strong element of self-assertion is discernible in the Homeric character of Athenè;—negative, when the predicate is denied of the subject, *e.g.*, The fantails are not hungry;—Logicians are not tolerant of words that have no fixed, clear and clean cut meaning;—The portrait of Hubert Herkomer is not in the Grosvenor.

VIII. Properties of Propositions. The principal properties of propositions are (1.) **equivalence,** (2.) **opposition,** (3.) **convertibility.**

(1.) **Equivalence** is the sameness of force and signification existing between various propositions, (a.) They may be equivalent by a simple change of words, *e.g.*, All fan-tails are white, is equivalent to, There is no fan-tail which is not white;—All his

adversaries were crushed by his stinging compressed oration in *Scheriè*, is equivalent to, There was not one of his adversaries who was not crushed by his stinging compressed oration in *Scheriè*.

(b.) Propositions may be equivalent because they belong to a whole which can resolve itself into parts, and these parts taken together must be equivalent to the whole: thus, in the above examples, All fan-tails are white—a universal affirmative proposition—is equivalent to the sum of all the singular propositions, This fan-tail is white; and so too, All the adversaries were crushed, equals the sum of all the singulars, This adversary was crushed.

(2.) **Opposition** is the contrast or diversity existing between two propositions which have the same subject and the same predicate, and may be a difference either of **quantity,** of **quality,** or of **both combined.** Hence the opposition may be:

(a.) **Contradictory,** *i.e.*, both in quality and quantity, or when a universal affirmative proposition is opposed to a particular negative, or a universal negative to a particular affirmative, *e.g.*, All fan-tails are white, of which the contradictory is, Some fan-tails are not white, No fan-tails are black, of which the contradictory is, some fan-tails are black: again, All German critics are of opinion that Hamlet's madness is feigned, has its contradictory in, Some German critics are not of opinion that Hamlet's madness is feigned; and, No sources of polytheism were dried up by the advent of Christianity, has its contradictory in, Some sources of polytheism were dried up by the advent of Christianity.

From this it is clear that, of two contradictories

one must necessarily be true, and the other false; because, if they were both together true or false, we should be affirming and denying something of a thing in the same relation, which would be absurd; and because from the truth of one we infer the falseness of the other, and *vice-versâ*.

(b.) **Contrary,** when the opposition is in the quality of the propositions, and both are universals, *e.g.*, All fan-tails are white, of which the contrary is, No fan-tails are white; again, All planets are round, is contrary to, No planet is round; and No knowledge comes to us through the senses, has its contrary in, All knowledge comes to us through the senses.

Contrary propositions cannot both be true at once, for the same reason given in the case of contradictory propositions; but sometimes both contraries may be false. Thus, the falseness of one may be inferred from the truth of the other; but from the falseness of one the truth of the other may not always be inferred.

(c.) **Sub-contrary,** when the opposition is—as with contraries—in the quality of the propositions, which are not—like contraries—universals, but particular, *e.g.*, Some fan-tails are tame, opposed to, Some fan-tails are not tame; Many little maidens are dumb, opposed to, Many little maidens are not dumb; Many boys are fond of getting "twenty Latin lines," opposed to, Many boys are not fond of getting "twenty Latin lines."

Two sub-contraries may sometimes be true together, *e.g.*, in the example of the fan-tails. Both together, however, can never be false, or

their universal contradictories would both be true, and so two contraries would be true at once, which is impossible. Hence, the truth of one may be at once inferred from the falsity of the other, but not *vice-versâ*, *e.g.*, from the falseness of the propositions, Many little maidens are dumb, and Many boys are fond of getting "twenty Latin lines," which from experimental knowledge I may know to be false, I can at once infer the truth of the opposite propositions, Many little maidens are not dumb, and Many boys are not fond of getting "twenty Latin lines."

(d.) Subalterns differ in quantity only, *e.g.*, Every fan-tail is white, to which corresponds the subalternate, Some fan-tails are white; Every ancient nation believed more or less distinctly in a future state, has for its subalternate; Some ancient nations believed more or less distinctly in a future state.

Subalterns can both together be true or false; hence the truth of one cannot be inferred from the falseness of the other, or *vice-versâ*. But if the universal or subalternant proposition be true, the particular or subalternate proposition must be true also, because it is virtually contained in the universal, as a part is contained in the whole, *e.g.*, "Some fan-tail" is contained in "Every fan-tail," "Some nation" in "Every nation." If, however, the particular subalternate is true, it does not follow that the universal subalternant is true too, for the universal is not comprised in the particular, *e.g.*, the particular proposition, Some Carthaginian soldiers were enervated at Capua, is true; but the universal, All Carthaginian soldiers were enervated at Capua, is quite false. On the other hand, if the

particular subalternate is false, the universal subalternate is false, the universal statement must *co ipso* be false likewise, for it stands to reason that what is denied of a part cannot be affirmed of the whole, *e.g.*, the false particular, Some planet is triangular, tells me clearly enough that its universal, Every planet is triangular, cannot be true. Yet, from the falseness of the universal subalternant we cannot infer the falseness of the particular subalternate, for it is possible that what is not true of a whole may be true of a part, *e.g.*, from the false universal. All Carthaginian soldiers were enervated at Capua: we cannot infer that its particular subalternate, Some Carthaginian soldiers were enervated at Capua, is false. Hence, from the truth of the subalternant the truth of the subalternate may be inferred, but not *vice-versâ*; while, on the contrary, from the falseness of the subalternate the falseness of the subalternant may be inferred, but not *vice-versâ*. It will have been seen that the opposition between subaltern propositions is more nominal than real.

(3.) **Convertibility,** is the property by which the subject of a proposition may be converted into the predicate, or the predicate into the subject. More shortly, this conversion is the transposition of the terms of a proposition. The proposition to be converted or transposed, is called convertible or the **convertend**; the new one resulting from the transposition is called the **converse,** *e.g.*, $4=2+2$ is convertible into $2+2=4$.

Conversion may be **(a.) simple,** or **(b.) per accidens.** First of all, it must be noted that in both forms the quality must remain unchanged.

(a.) In **simple** conversion the same quantity is retained as well as the same quality, *e.g.*, No circle is a quadrangle, convertible into, No quadrangle is a circle; No tea-tray is a star-convertible into, No star is a tea-tray. Because, in simple conversion, the two judgments are identical, it follows that either both must be true or both false, and so the truth of one can be inferred from the truth of the other, or the falseness of one from the falseness of the other.

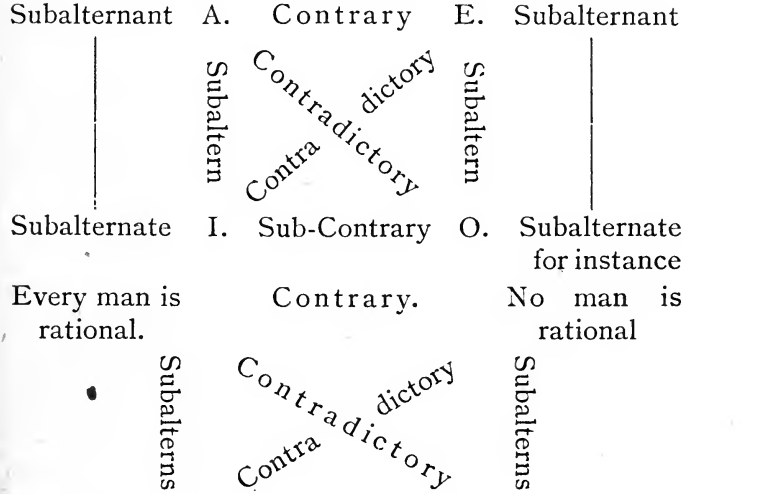
(b.) In Conversion **per accidens** the quantity is changed, *e.g.*, every man is an animal, convertible into, Some animal is man; all Q.C.'s are lawyers, convertible into, Some lawyers are Q.C.'s If, in conversion per accidens, the convertend is true, the converse must be true, *e.g.*, every animal is sentient, converse, something sentient is animal; and, if the converse is false, so too must be the convertend, *e.g.*, something that is irrational is man, converted from, All men are irrational. On the contrary, if the covertend is false, it does not follow that the converse need be false, *e.g.*, All animals are quadrupeds, a false convertend, has a true converse in, some quadrupeds are animals; and, if the converse is true, it cannot be inferred that the convertend is true, as can be seen from the foregoing example. Hence, from the truth of the convertend we can infer the truth of the converse, but not *vice-versâ*; and from the falseness of the converse, the falseness of the convertend, but again not *vice-versâ*.

(4.) It is clear that conversion of propositions implies some process of reasoning capable of being reduced to logical form, *e.g.*, $4=2+2 \therefore 2+2=4$, All planets are heavenly bodies $\therefore$ Some heavenly

bodies are planets; and so we are brought from the **matter** of formal logic to its **form.** Before passing on to it, however, the explanation of the properties of propositions may be simplified by the following table, which is usually given in manuals of logic:

Symbol. **Proposition.**

A. = Universal affirmative.
E. = Universal negative.
I. = Particular affirmative.
O. = Particular negative.



because:

Every man is rational =A.=Universal affirmative.
No man is rational =E.=Universal negative.
This man is rational = I.=Particular affirmative.
This man is not rational=O.=Particular negative.

CHAPTER III.

IX. Form of the act of the agent. X. Definition of the syllogism. XI. Rules of the syllogism.

IX. Form of the "Act of the Agent." In the paragraph on the Division of the "Act of the Agent," it has been shown that the form of the act consists in the internal discourse of the mind which is called reasoning, *i.e.*, in that disposition of ideas and statements, by means of which the intellect attains its end of knowing truth. As the idea, or simple word of the intellect is treated of under the sign **term**, and the statement or "judgment," or complex word of the intellect under the sign **Proposition**; the discourse of the mind or reasoning has for its sign the **syllogism.**

X. Syllogism, Definition. The syllogism is called by Aristotle: "a sentence in which, some things being affirmed, others must necessarily follow from that affirmation." Viewed with relation to its matter, *i.e.*, terms and propositions, the syllogism may be called: a disposition of terms and propositions arranged in such a manner, that from what is known that which is unknown may be deduced. This definition will be found to apply both to deductive and inductive reasoning, and may be stated more simply as: An argument, in which one proposition is gathered or inferred

from two other propositions, by a comparison of the three terms of the argument.

The syllogism then has **three terms** so distributed in three propositions that each one is repeated twice, *e.g.*,

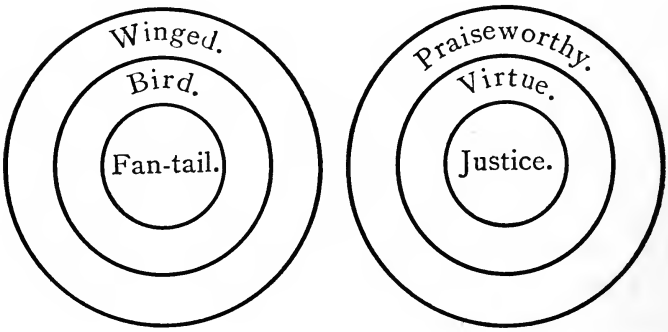
Every bird is winged;
But every fan-tail is a bird:
Therefore every fan-tail is winged.

Again:

All virtue is praiseworthy;
But justice is a virtue;
Therefore justice is praiseworthy.

Of these three terms one is called the comparative or **middle term,** for with it the other two are compared. They are called **extreme terms;** and that one which forms the predicate of the conclusion, or final inferred proposition, is called the greater or **major extreme,** or **major term;** while that which forms the subject of the conclusion is called the **minor extreme** or **minor term.** The reason of their having these names is, that usually in universal affirmative propositions, which, being more perfect than negative ones, supply the names, the predicate has greater extension than the subject, and so the subject has less. As the words are used by logicians, **extension** signifies all the things to which a term applies, while **intension** means the qualities or properties and peculiarities implied in the term, in other words, its definition. Hence the saying that "intension and extension stand in inverse ratios to one another," so that as one increases the other diminishes, *e.g.*, compare ship and steam-ship, pigeon and fan-tail; ship has greater extension than

steam-ship, which has clearly greater intension than ship; and so with pigeon and fan-tail.[1] The remaining term of the syllogism is called the **middle term** because, generally speaking, its extension is less than that of the **major,** and greater than that of the **minor.** To make this clear, we can put our examples into diagram:



Here, winged is the major, fan-tail the minor, and bird the middle term; praiseworthy the major, justice the minor, and virtue the middle term. It is obvious that in these two instances winged and praiseworthy are the terms that have greatest extension, while it is equally evident that fan-tail and justice are the terms with least extension, and so with greatest intension.

The three **propositions** in every syllogism are **(1.)** the **major premiss,** in which the major is compared with the middle term; **(2.)** the **minor premiss,** in which the minor is compared with the middle

[1] See p. 19 for application of universals, and p. 72 *et seq.* for definition.

term; (3.) the **conclusion,** in which the minor is compared with the major term. The two premisses are so called, because they are put forward, or put first, for the purpose of being reasoned about; and they are specified as major and minor because they contain the major and minor terms respectively. The third proposition gathered or deduced from the other two, is called the conclusion, probably because the argument is finished when we have learned what this third or last proposition should be. The whole process can be made clear as follows:

Major Term: Praiseworthy.
Middle Term: Virtue.
Minor Term: Justice.

From these terms we form the collateral syllogism.

Major Premiss: Every virtue is praiseworthy.
Minor Premiss: But justice is a virtue.
Conclusion: Therefore justice is praiseworthy.

Again:

Major Term: Winged.
Middle Term: Bird.
Minor Term: Fan-tail.

From these terms we form the collateral syllogism.

Major Premiss: Every bird is winged.
Minor Premiss: But every fan-tail is a bird.
Conclusion: Therefore every fan-tail has wings.

From what has already been said of the **matter** and **form** of the syllogism, it is evident that a distinction must be made between its **material** and **formal truth.** It is materially true when the propo-

sitions, of which it is formed, are in themselves true: and it is formally true, or correct, if, or rather in so far as its remote matter (terms) are so placed, and its proximate matter (propositions) are so formulated, that the conclusion necessarily follows from the two premisses. Hence an argument or syllogism may be formally true and materially false, and again it may be materially true and formally untrue. But to be perfectly correct or good, it must be both materially and formally true. For instance, the syllogism:

Every beast is irrational;
But man is not a beast:
Therefore man is not irrational,—

is materially true, but formally it is quite untrue or incorrect. From the premisses: Every beast is irrational; but man is not a beast,—I cannot conclude that man is not irrational, for I might draw precisely the same conclusion about a stone, because it is not a beast. On the other hand, the syllogism:

Every substance is material;
But the soul is a substance:
Therefore the soul is material,—

is formally true or correct, but materially untrue because the major premiss is materially untrue.

If the two premisses are materially true, it is obvious that, if the syllogism be formally true, its conclusion must be materially true, because it is **impossible to deduce error from truth.** And, consequently, if the conclusion is materially false, one of the two premisses must be so too, for, unless this were the case, a false conclusion would not be obtained.

Yet, if one of the two premisses is false, it does not necessarily follow that the conclusion will be false. It may be false, it may be true; yet, if true, it is so only per accidens, for its truth is not the result of the argument. And, because in such a case the conclusion can be true per accidens only, it follows that it is so, not in itself, *i.e.*, not as the conclusion, or else the two premisses would be true too, *e.g.*, in the syllogism:

Every virtue is good;
But health is a virtue:
Therefore health is good,—

the conclusion is materially true, and at the same time the minor premiss is materially false. And in the example:

All novels are harmless;
But *Quentin Durward* is a novel:
Therefore *Quentin Durward* is harmless,—

the conclusion is materially true, while the major premiss is materially and most decidedly false. From this general view of the syllogism we pass to

XI. The Laws or Rules according to which the syllogism should be formed, and which concern its **matter** and **form** respectively.

(1.) With regard to the **matter** of syllogisms, the principal rule is that **both premisses should be true,** as has been shown. The extent of that matter is sufficient to prove that the further rules do not come within the scope of purely Formal Logic. We shall meet with them later on in treating of Method and Material Logic.

(2.) The eight rules given by the Scholastics for the **Form** of the Syllogism are based on the two prin-

ciples or canons: (a.) **Dictum de omni, dictum de nullo**=whatever is predicated (*i.e.*, affirmed or denied) of a term taken universally, may be predicated in like manner (*i.e.*, affirmed or denied) of everything contained under it; (b.) **Quæ conveniunt in uno tertio, conveniunt inter se; quæ repugnant in uno tertio, repugnant inter se**=Two things or terms, which agree with one and the same third term, agree with one another; two things or terms, of which one agrees and the other disagrees with one and the same third term, disagree with one another.

Rule I. A syllogism must contain three terms, and not more than three terms; three propositions, and only three propositions. The reason is that syllogising consists in comparing two terms with each other by means of a third term; and, if there were four terms, the argument would consist either of two syllogisms, or of none at all. Suppose the terms to be,—cow, cloven-footed animal, ruminating animal, animal having two stomachs. We may compare the first with the second term, and the third with the fourth; but this will not give a conclusion, unless we have another proposition comparing the second with the third term; and this proposition would give us another syllogism. The reason of the part of rule concerning propositions is that, if there were four propositions, one would be the conclusion, and the other three the premisses; and three premisses will either make no comparison, or they will form two syllogisms. This can easily be made clear by reconsidering the example of the

cows, or the following: oxygen, simple body, carbonic acid gas, compound body.

It is obvious to remark that, whenever any one of the three terms is used in the syllogism, it must have the same sense and the same application; otherwise we should have four terms, *e.g.*, in the syllogism:

All beasts of the earth were created on the sixth day;

But my dog is a beast of the earth:

Therefore my dog was created on the sixth day,—

the middle term, beast of the earth, is applied in the major premiss to the first members of the species, and in the minor to an individual; and thus the syllogism has four terms.

Rule II. There should be nothing in the conclusion which is not in the premisses, *i.e.*, no term should have greater extension in the conclusion than in the premisses. The reason is that what is more universal cannot be contained in what is less universal; and, if the term in the conclusion were taken in a wider meaning than it had in the premisses, it could not in this wider meaning be contained in them, and so could not be drawn from them. Moreover, there would be a fourth term introduced by comparing a part only of the extreme with the middle term, and the whole of it in the conclusion with the other extreme term, *e.g.*:

What I am, you are not;

But I am a man:

Therefore you are not a man,—

where it is clear that man is used in a wider meaning in the conclusion than in the minor premiss.

Again :

All just men are praiseworthy ;

But some Greeks are just men :

Therefore all Greeks are praiseworthy.

Here again, the minor term has greater extension in the conclusion than in the minor premiss ; and there are really four terms in the syllogism, viz., praiseworthy, just men, Greeks used as a particular term, and Greeks used as a universal term.

Rule III. The middle term must be distributed, *i.e.*, taken universally or in its whole extent of meaning, once at least in the premisses. The reason is that, unless we take the whole of the middle term once, the two premisses may refer to different parts of the middle term, so that there will be no true middle term at all, and in fact there will be four terms, *e.g.*, in the syllogism :

Some animal is endowed with reason ;

But the horse is some animal :

Therefore the horse is endowed with reason,—

the middle term, animal, designates the animal that is man in the major premiss, while in the minor it signifies an animal that is a brute, and so in neither case is taken in its full extent of meaning, or universally. And in the syllogism :

Some poet never gives an epithet of colour to a flower ;

But Shakespeare is some poet ;

Therefore Shakespeare never gives an epithet of colour to a flower,—

the middle term, in the major premiss designates Homer ; and in the minor premiss, Shakespeare ; and thus is never taken universally.

Rule IV. The middle term must not appear in the conclusion, either wholly or in part. The reason is that the comparison of subject with predicate, by means of the middle term, is made in the premisses; while the conclusion gives the relation between the subject and predicate themselves, *e.g.*:

Alexander was a general;

But Alexander was little;

Therefore Alexander was a little general,—

offends against this rule. So, too, does:

Alice tumbled down the rabbit-hole in her dream;

But Alice was wide-awake;

Therefore Alice, wide-awake, tumbled down the rabbit-hole in her dream.

Rule V. No Conclusion can be drawn from two negative propositions or premisses. The reason is, that the middle term is then one with which extreme disagrees, and not one with which one extreme agrees and the other disagrees, *e.g.*, from the propositions:

Man is not eternal;

But animals are not eternal,—

no conclusion whatever can follow, neither can we draw one from

Mustard is not a min[illegible]he[illegible];

But charlock is not [illegible] ru[illegible]ineral.

Rule VI. No Co[illegible] sy[illegible]sion can be drawn from two particular propo[illegible]des[illegible]ons. The reason is that, if both are affirmati[illegible]e just[illegible]e middle term in both is taken only in its [illegible]men ar[illegible] extent of meaning, *i.e.*, would be undistrib[illegible]se diar[illegible]which would be contrary to Rule III.; and, [illegible] propositions are not affir-

mative, either the middle term is again undistributed, or else the major or minor term has greater extension in the conclusion than in the premisses,—and this is contrary to Rule II., *e.g.* (two affirmatives) :

Some virtues are pleasing to men ;
But some things that are pleasing to men are displeasing to God :
Therefore some things that are displeasing to God are virtues.

This is wrong, because the middle term, pleasing to like en, is taken universally in neither premiss. And a Sor ault is committed in :

But s e man is living ;
Therefo me man is dead ;

Again (a nega something that is living is dead.

Some men ar ive and affirmative) :
But some soldiers ave :
Therefore some so sc are not brave ;

Here men is taken un rse ldiers are not men.
it is a particular term im iversally in the conclusion, but
manner ; r in the major premiss. In like

Some books are ha a
But *Robinson Crusoe* ll d to understand ;
Therefore *Robinson* syll not hard to understand,

shows a term (book) use ves a *soe* is not a book,—
sion, while in the major niversally in the conclu-
term. some premiss it is a particular

Rule VII. A negati are nev
drawn from two affirma r,—
if both premisses are affi e major premiss designates
both extremes agree with nor premiss, Shakespeare ;
univ lly.

it follows that they must consequently agree with one another. For instance, no amount of ingenuity can draw a negative conclusion from the two affirmative propositions:

All quadrilateral figures are contained by four straight lines;

But a rhombus is a quadrilateral figure.

The conclusion can be nothing else but the affirmative:

Therefore a rhombus is contained by four straight lines.

Rule VIII. If one premiss be negative, the conclusion must be negative; and if one premiss be particular, the conclusion must be particular. The reason of the first part of this rule is, that the remaining premiss is affirmative (according to Rule V.), and hence one of the extremes agrees with the middle term, and the other disagrees with it; and therefore the extremes disagree with one another, *i.e.*, the conclusion is negative. The reason of the second part of the rule is that if the conclusion were universal, while one of the premisses was particular, there would be something in the conclusion that is not in the premisses, which would be a violation of Rule II., and involve a violation of Rule I. by introducing a fourth term. The examples already given of the violation of these rules will make this clear. So, too, will the correct syllogisms:

Every just being is deserving of esteem;
if both are ta[illegible] are just beings:
taken only in its men are deserving of esteem.
would be undistri[illegible]se diameters are unequal, can be
Rule III.; and,

But these two circles have unequal diameters:
Therefore these two circles cannot be equal.

In nearly all manuals of Logic, it is shown that if we try in how many different ways we can make syllogisms with the four kinds of propositions,[2] we can get many good kinds of arguments. These are called the **moods or modes of the syllogism,** and they are divided into **four figures,** each figure being known by the position of the middle term in the premisses; whence **figure** may be defined the position of the middle term in relation to the two extreme terms in the premisses, and **mode** the combination of the quantity and quality in the proposition. Logicians have given names to the different kinds of modes; but, as these modes are merely forms in which the rules of the syllogism can be kept, we shall always be able to tell whether a syllogism is correct if we understand its rules well, and so we can for the present pass by the names of the modes, as of no very great practical importance.

[2] See p. 31.

CHAPTER IV.

XII. Divisions of the syllogism.

XII. Divisions of the Syllogism.—Regular or Complete Syllogisms may be either **Simple** or **Compound**; simple, when they are made of simple propositions; compound, when they are made of compound or composite ones.

(1.) **Simple or Categorical** Syllogisms consist of categorical propositions, sometimes called propositions *de inesse*, from their asserting that the predicate is, or is not, contained in the subject. To these Categorical Syllogisms apply *in toto* the eight rules already explained; while the first canon or principle on which they are based, *i.e.*, Dictum de omni, dictum de nullo, applies immediately to the categorical syllogism. To other syllogisms the dictum applies only ultimately, for this application has, as a rule, to be reached and proved by reducing them to categoricals. The examples of syllogisms already given are all categorical. By re-examining two of them, we shall see how the categorical syllogism depends immediately on the first canon, which serves as a basis for Aristotle's eight rules. Thus, in the example:

All virtue is praiseworthy;
But justice is a virtue:
Therefore justice is praiseworthy,—

virtue is related to justice as genus to species, and hence the term, praiseworthy, must, if it applies to virtue, apply also to justice; because, according to the Dictum de omni, what belongs to the genus necessarily belongs to the subordinate species, and what belongs to the species belongs in like manner to the individuals contained in the species; and therefore we cannot deny of the species what we affirm of the genus; nor can we deny of the individual (as member of the species) what we affirm of the species. The following example will illustrate the application to categoricals of the Dictum de nullo:

No planet is a fixed star;
But Uranus is a planet:
Therefore Uranus is not a fixed star.

Here the term planet indicates species, while the term Uranus designates a member of the species: hence the term, fixed star, if denied of planet, must in consequence be denied of Uranus, because what is opposed to the nature of the species must be opposed to the nature of the individuals belonging to the species; and therefore we cannot affirm of the individual what we deny universally of the species, any more than we can affirm of the species what we deny universally of the genus.

This explanation is merely a development of what has already been said[1] of the Dictum de omni, dictum de nullo, which—if looked at more closely—will be seen to be immediately resolvable into the principle that a thing cannot both be and not be at the same time and under the same conditions, *i.e.*,

[1] P. 38.

into the principle of contradiction, which is the first of all principles. For instance, if we affirm that the genus, virtue, is praiseworthy, and deny that the species, justice, is praiseworthy, we are evidently affirming that something belongs, and at the same time does not belong to the genus, which would be impossible. And we also offend against the principle of contradiction, and consequently enunciate an absurdity, if we affirm of the specific nature of Uranus what we deny of the nature of its species, planet; or if we affirm of the species maidenhair fern what we deny universally of the genus, polypodiacea, a particular order or class of ferns.

(2.) **Compound** syllogisms are either (a.) **hypothetical or conditional,** (b.) **copulative or conjunctive,** (c.) **disjunctive.**

(a.) **Hypothetical** or **conditional,** in which the major premiss at least is a hypothetical proposition, *i.e.*, one consisting of two parts, the **antecedent,** containing the little word "if," and the **consequent,** which tells us what will happen under the supposed circumstances. In the major premiss, therefore, the middle and major terms stand to each other in the relation of **condition** and **conditioned**; and the conditional form of the syllogism itself resulting from that relation, is based upon the principle that nothing can either be or not be without a sufficient reason, *i.e.*, upon the principle of sufficient reason, which is one of the fundamental laws of thought, *e.g.*, in the syllogism:

If Matthew is a man, he is mortal
But Matthew is a man:
Therefore Matthew is mortal,—

the principle, that nothing can be without a sufficient reason, clearly enough underlies the argument that leads to the conclusion. According to this principle, it follows that the truth of the thing conditioned can be inferred from the truth of the condition, while the falseness of the condition can be inferred from the falseness of the thing conditioned. Herein we have the basis of the **rules** of the hypothetical syllogism, which are: **If the antecedent be affirmed, the consequent may be affirmed. If the consequent be denied, the antecedent may be denied.** Hence the thing conditioned must be affirmed in the conclusion from the affirmation of the condition in the minor premiss; or the thing conditioned must be denied in the minor premiss, and consequently the condition must be denied in the conclusion, *e.g.*:

If this boy likes story-books with much morbidness in them and little cheeriness, his taste for reading is probably not healthy;

But this boy does like story-books with much morbidness in them and little cheeriness:

Therefore his taste for reading is probably not healthy.

And in the following example we have the condition denied from the denial of the thing conditioned:

If Heyse's theory of friendship be true, his *Stories of Friendship* must be true to life;

But his *Stories of Friendship* are not true to life:

Therefore his theory of friendship is not true.

The connection between the antecedent and the consequent in the hypothetical proposition is called

the **consequence**; and it is entirely upon this consequence that the truth or falsehood of the hypothetical or conditional proposition depends, and not at all upon the truth or falsehood of the antecedent, or of the consequent, or of both of them, *e.g.*:

If the evolutionists are right, man is only a developed ape.

If we cannot conceive what we cannot imagine, we cannot conceive space to be non-existent.

In these examples both the antecedent and consequent are false, yet the conditional composed of them is true, *i.e.*, one is a true consequence from the other. It is obvious that the truth of this conditional is essential to every good hypothetical syllogism.

It is important not to fall into the error of reversing the terms of the two rules stated, *i.e.*, to affirm the consequent, and then infer that we can affirm the antecedent; or to deny the antecedent, and then infer that we can deny the consequent. The reason of this is that the truth of the condition cannot be inferred from the truth of the thing conditioned, nor the falseness of the thing conditioned from the falseness of the condition, because a given effect or result may have many different causes or reasons. Hence, when we affirm the truth of an effect or result, we cannot infer the truth of the cause or reason assigned to it; and, for the same reason, it does not follow that, because the cause or reason assigned is false, the effect *per se* must necessarily be false, *e.g.*, from the major premiss:

If Jenkins has committed forgery, he is liable to be prosecuted,

I cannot argue either that

Jenkins is liable to be prosecuted;

Therefore he has committed forgery;

Or that

Jenkins has not committed forgery;

Therefore he is not liable to be prosecuted,—

because liability to prosecution has many other causes besides forgery. Moreover, in affirming the antecedent from the consequent, it is evident that the third general rule of the syllogism is broken; for the middle term "liable to be prosecuted" is not distributed in either premiss. In like manner, the middle term "man" is undistributed in the following example:

If he is a man, he is an animal;

But he is an animal;

Therefore he is a man.

Again, to deny the antecedent from the denial of the consequent, is to violate the second general rule of the syllogism, *e.g.*, in the instance already given, "liable to be prosecuted" has greater extension in the conclusion than in the major premiss, and so too has the term "man" in the argument:

If he is a philosopher, he is a man;

But he is not a philosopher;

Therefore he is not a man.

(b.) **Copulative** or **Conjunctive,** in which the major premiss is a copulative proposition; strictly speaking, this major should be a negative copulative. The **rules** of this kind of syllogism are: **The copulative or conjunctive proposition must be true. If one of the things conjoined be affirmed in the minor premiss, the other or others are denied in**

the conclusion. The reason is, that a negative copulative asserts that two or more attributes cannot at the same time be predicated of the same subject, yet without affirming that one of them must necessarily be predicated of it, *e.g.:*

The moon cannot at the same time have a fourfold motion and be motionless;
But the moon has a fourfold motion;
Therefore the moon is not motionless.

Here the negative copulative, while asserting the impossibility of the co-existence of rest and fourfold motion, does not affirm that either one or the other must necessarily be predicated of the moon. In this lies the main difference between the copulative and the disjunctive syllogism, of which we shall treat next. For the same reason, the terms of the second rule cannot be reversed, *i.e.*, we cannot deny one of the conjoined things or terms in the minor premiss, and then affirm the rest in the conclusion; because it will generally happen that the enumeration in the copulative proposition is not a complete one, and therefore that something not contained in that enumeration may be predicated of the subject, *e.g.:*

Peter is not at the same time standing and sitting;
But he is standing;
Therefore he is not sitting:—

Or

But he is sitting;
Therefore he is not standing.

But we cannot argue from the same major: he is not standing; therefore he is sitting; for he might

be kneeling, or lying down, or in some other position. Again, from the major:

No man can serve God and mammon,

It does not follow that, because

Many do not serve mammon;

Therefore they serve God,

For they may have given themselves over to the service of some passion other than the love of money. St. Francis Xavier, for instance, before his conversion by St. Ignatius, bid fair to become the slave of love of human glory; and no one will say that it was love of money that held St. Augustine and De Rancé and Father Hermann enthralled before grace triumphed in their hearts. Of course, if the enumeration in the copulative proposition were quite complete, the transposition of the rule would be correct, *e.g.*:

It cannot be at the same time day and night:

But it is not day;

Therefore it is night.

For it must be either one or the other.

Though differing in form from the disjunctive syllogism, the conjunctive syllogism is generally resolvable into it, and always closely allied to it, for both are based alike on the same fundamental law of thought, viz., on what is called the "principle of the excluded third," *i.e.*, that there is no mean between two contradictories; for, if a thing cannot both be and not be at the same time and under the same conditions, it necessarily follows that it must either be or not be. Being and not being absolutely exclude one another: a mean between those extremes is inconceivable. And it is the same with our minds:

they must either affirm or deny what is predicated of the subject: between affirmation and denial there is no mean. For instance, the conjunctive proposition, "No one can at the same time sing and play the flute," leaves no middle course open between affirmation and denial; neither does the disjunctive proposition into which it can be resolved. He either sings or plays the flute, which may be further simplified into,—He either sings or he does not sing; he either plays the flute or he does not play the flute. Thus, as the principle of contradiction is the principle of affirmation and denial, the principle of the excluded third asserts that between affirmation and denial there is no middle course.

(c.) **Disjunctive**, in which the major premiss is a disjunctive proposition, *i.e.*, one which has several terms joined by the word "or," or by some other disjunctive particle, and in which the relation between the major and middle term in the major premiss is one of opposition. As we have seen, the form of the disjunctive is like that of the conjunctive syllogism, determined by the principle of the excluded third, which is the basis of the chief **rule** of the disjunctive sollogism, which is: **If one or more alternatives be denied, the rest may be affirmed.** Hence the disjunctive major must be true, *i.e.*, one, or some of its members must be true, or the disjunction would be false; and there must be opposition between the members: the distribution or enumeration of members must be adequate, *i.e.*, it should include all members that might be enumerated; and no member should include another member. The application of the rule to syllogisms

in which the disjunctive major has only two members, is that one member will be denied in the minor premiss, and the other affirmed in the conclusion. In syllogisms, in which the disjunctive major premiss has more than two members, and only one is denied in the minor premiss, the rest will be affirmed in the conclusion, which thus becomes a copulative or conjunctive proposition. As instances of these two applications, we may take:

The sun either moves or is stationary;
But it is not stationary;
Therefore it moves.

Titian's "Noli me tangere" is either in the Manfrini Palace, Venice, or in the National Gallery; But it is not in the Manfrini Palace, Venice;
Therefore it is in the National Gallery.

A known planet must either be Mercury, or Venus, or the Earth, or Mars, or Jupiter, or Saturn, or Uranus, or Neptune, or one of the planetoids.
But it is not one of the planetoids; Therefore it must be either Mercury, or Venus, or the Earth, or Mars, or Jupiter, or Saturn, or Uranus, or Neptune.

This four-sided figure must be either a square, an oblong, a rhombus, a rhomboid, or a trapezium;
But it is neither a square nor an oblong;
Therefore it must be either a rhombus, a rhomboid, or a trapezium.

It is sometimes said that the terms of the rule of the disjunctive syllogism may be reversed, and so

that: **If one or more alternatives be affirmed, the rest may be denied**; hence that when the minor premiss affirms one or more members, the rest will be denied in the conclusion. This must necessarily be the case where there are only two members or alternatives in the major premiss: but it is possible, when there are many members in the major premiss, that we may affirm one in the minor, and yet not be able to deny the rest in the conclusion, *e.g.*, a magistrate is either a justice of the peace, or a mayor, or a stipendiary magistrate; but it does not follow that one who is a justice of the peace is not a mayor. Yet it is obvious that the disjunction is true, and the enumeration adequate in the example given. So is it likewise when we say, Tilly was defeated either at Wimpfen, or Höchst, or Lutter, or Breitenfeld, or the Lech, or some other battle in which he commanded; but we cannot conclude that because he was defeated at Breitenfeld, he was not defeated in any other battle, for Gustavus Adolphus gained the day at the battle of the Lech. We see then that we can only rightly affirm one alternative, and then deny the others, if there be such a difference between them that they could not be true at the same time, *e.g.*, if I am examining the planet Jupiter through a telescope, and I see his moon Ganymede, I can say,—Because this moon is Ganymede, it can be neither Io, Europa, nor Callisto. Or I am examining a class of seven small boys; a bright little fellow attracts my attention; I look at the class-list and see that this boy must be either Sinbad, or Selim, or Aladdin, or Crusoe, or Merton, or Alfgar, or Tempeston; the teacher at my side whispers

that it is Alfgar, thus supplying a minor premiss; whereupon, supposing the enumeration in my major, the class-list, to be adequate, I am quite justified in concluding that my young examinee is neither Sinbad, nor Selim, nor Aladdin, nor Crusoe, nor Merton, nor Tempeston.

From what has been said of the disjunctive syllogism, it is clear that it does not obey all the general rules of the syllogism, *e.g.*, in our last examples a negative conclusion is drawn from two affirmatives, which is contrary to Rule VII.; and, in the first examples of the disjunctive syllogism, an affirmative conclusion follows from premisses, of of which one is negative, which is against Rule VIII. This rule is also broken in conjunctive or copulative syllogisms when their conclusion is affirmative:[5]

(3.) The general **rule** for **testing the validity of compound,** *i.e.*, hypothetical, conjunctive, and disjunctive **syllogisms,** is **to reduce them to the simple** or categorical syllogism, which is the means of applying to them the *Dictum de omni, dictum de nullo,* to which they must be conformed if they are valid, or have a true illation, and which, as we have seen, applies immediately to all categorical syllogisms. This reduction need not usually be difficult; for the two extreme terms are found in the conclusion, and the middle term is seen in the premiss. When we have our three terms, we can readily form them into a categorical syllogism, *e.g.*, the hypothetical:

If God is just, He will reward virtue;
But He is just;
Therefore He will reward virtue;

5 See xii. 2. b.

can be reduced to the categorical:

A just being will reward virtue;
But God is a just being;
Therefore God will reward virtue.

CHAPTER V.

XIII. Incomplete and extended syllogisms.

XIII. Incomplete and **Extended Syllogisms.** So far we have been considering complete Syllogisms, *i.e.*, those which are stated at full length, and end with the conclusion drawn from two premisses. But, usually speaking, only one premiss is stated, and a reader can without difficulty judge, from its union with the conclusion, what the suppressed premiss should be. Such syllogisms are called **Incomplete.** Again it often happens that a conclusion is not reached by one syllogism, but by a series of syllogisms, each of which is in some way dependent on the one going before it; and these syllogisms are known as **Extended.** By some logicians those two classes of syllogisms are called "forms of argument akin to the syllogism," as they are not in strict syllogistic form.

(1.) Under **Incomplete Syllogisms** we have—

(a.) The **Enthymeme,** in which one of the two premisses is suppressed, but the conclusion is introduced by "therefore," "hence," or some equivalent word. Thus we may call the Enthymeme an argument in which the conclusion is deduced imme-

diately from one of the premisses without a formal syllogism, *e.g.*,

The human soul is spiritual;

Therefore it is immortal.

Here the major premiss, what is spiritual is immortal, is evidently understood. And, in arguing that

The radii of the same circle are equal to one another,

Therefore these lines are equal to one another,

the conclusion is at once deduced from the major premiss, the minor, These lines are radii of the same circle, being suppressed.

(b) The **Contracted Syllogism,**—which is really a causal proposition,[1]—in which one premiss is suppressed, and the other is united to the conclusion by "because," "since," "for," or some equivalent word, *e.g.* Man thinks because he is rational, is a contraction of the syllogism:

Rational beings think;

Man is a rational being;

Therefore man thinks.

And, when we say, The thermometer is below 32° Fahrenheit because it is freezing, we are reasoning from the suppressed major premiss, whenever it freezes the thermometer is at or below 32° Fahrenheit.

(2.) The **Extended Syllogism** may be either a

(a.) **Polysyllogism,** in which two or more complete syllogisms are so united in a series that the conclusion of one forms a premiss (usually the first premiss) of that one which follows it, *e.g.*, the co[illegible]te syllogisms,

[1] See p. 23.

1. An infinitely perfect being is infinitely just;
   But God is an infinitely perfect Being;
   Therefore God is infinitely just.
2. He who is infinitely just, punishes evil;
   But God is infinitely just;
   Therefore God punishes evil.
3. God punishes evil;
   But calumny is evil;
   Therefore God punishes calumny.

May be thrown into a polysyllogism thus:

Major. An infinitely perfect being is infinitely just;

Minor. But God is an infinitely perfect Being;

Conclu. of 1, *and Minor of* 2. Therefore God is infinitely just.

Major. He who is infinitely just punishes evil:

Conclu. of 2, *and Minor of* 3. Therefore God punishes evil.

Major. But calumny is evil;

Conclu. Therefore God punishes calumny.

The polysyllogism is generally used either when the train of reasoning is evident, or to shorten a prolix argument. When the single syllogism constituting the series are all of the same kind (*i.e.*, when they are all categorical, or all hypothetical), we have a "pure" polysyllogism; otherwise the polysyllogism is known in contradistinction, as "mixed." The syllogistic series, out of which an actual polysyllogism may be formed, or into which it may be resolved, is sometimes called the "perfect polysyllogism," because it is in perfect syllogistic form; while the polysyllogism formed from it is designated a "contracted polysyllogism," because in each link of the

argument one premiss is really suppressed. This may be illustrated by the following syllogistic series and the polysyllogism to which it is reduced:

1. That which is composed of parts is limited;
   But matter is composed of parts;
   Therefore matter is limited.
2. That which is limited is subject to change;
   But matter is limited;
   Therefore matter is subject to change.
3. That which is subject to change supposes succession;
   But matter is subject to change;
   Therefore matter supposes succession.
4. That which supposes succession must have had a beginning;
   But matter supposes succession;
   Therefore matter must have had a beginning.
5. That which must have had a beginning cannot be eternal;
   But matter must have had a beginning;
   Therefore matter cannot be eternal.

From this we get the polysyllogism.

Major. That which is composed of parts is limited;

Minor. But matter is composed of parts;

Conclu. of 1, *and Minor of* 2. Therefore matter is limited.

Major. That which is limited is subject to change;

Conclu. of 2, *and Minor of* 3. Therefore matter is subject to change.

Major. That which is subject to change, supposes succession;

Conclu. of 3, *and Minor of* 4. Therefore matter supposes succession.

Major. That which supposes succession must have had a beginning:

Conclu. of 4, *and Minor of* 5. Therefore matter must have had a beginning.

Major. That which must have had a beginning, cannot be eternal;

Conclu. Therefore matter cannot be eternal.

(b.) **Epichirema,** where the reason of the union of the subject and predicate is indicated in one or both of the premisses. Such a premiss thus becomes a causal proposition or contracted syllogism, and hence the Epichirema may be resolved into as many syllogisms as it contains causal propositions *plus* the main syllogism, *e.g.*,

Every spiritual being is incorruptible, because it has no parts and does not depend on matter;

But the human soul is a spiritual being, for if it were not so, it would be incapable of thought;

Hence the human soul is incorruptible.

It is obvious that this example is resolvable into many syllogisms. First, we take the main argument:

Every spiritual being is incorruptible;

But the human soul is a spiritual being;

Therefore the human soul is incorruptible.

In proof of the major we have—

That which has no parts is incorruptible;

But all spiritual beings have no parts;

Therefore all spiritual beings are incorruptible.

That which does not depend on matter is incorruptible;

But spiritual beings do not depend on matter;
Therefore spiritual beings are incorruptible.

And in proof of the minor—

If the human soul is capable of thought, it must be a spiritual being;
But the human soul is capable of thought;
Therefore the human soul must be a spiritual being.

This may be reduced to a categorical by changing the major premiss into—

Whatever is capable of thought, must be a spiritual being.

It must now be clear that the Epichirema is not a single argument, but a combination of many arguments. It is generally used in elucidating obscure questions, or in addressing readers or hearers who are known to be opposed to the conclusion.

(c.) **Sorites,** in which the predicate of the first proposition is the subject of the second; the predicate of the second, the subject of the third; and so on till the conclusion, which is formed of the subject of the first and the predicate of the last. Hence there will be as many syllogisms in the sorites as there are propositions between the first premiss and the conclusion, which is reached through a series of major premisses, the first premiss being the only minor expressed in the sorites. Thus, no proposition except the first should be particular; and if that be particular, the conclusion must be so also; and no proposition except the last may be negative, and then the conclusion will be negative, *e.g.*,

God is a necessary Being;
A necessary being is a perfect being;
A perfect being is an omnipotent being;
An omnipotent being can do all things;
Therefore God can do all things.

Here we have three syllogisms formed of the—

Major Term: Do all things;
Middle Terms: A necessary being; A perfect being; An omnipotent being;
Minor Term: God.

And the sorites formed from them differs from the polysyllogism only in the suppression of the immediate conclusions, which thus must in the sorites, as in the polysyllogism, form one of the premisses of the next syllogism. Should they not do so, the sorites will be formally false; and hence its formal truth may be proved by reducing it to a series of simple syllogisms. Its material truth will be destroyed, or at all events injured, by introducing into the series of major premisses either false or ambiguous terms; for this would be either to break or to weaken the chain of the argument, and, by rendering the conclusion unwarrantable, to destroy its value.

The sorites may be either categorical, *i.e.*, formed of categorical propositions, as in the example given; or hypothetical, *i.e.*, formed by hypothetical propositions, *e.g.*,

If Timour is a man, he is a rational animal;
If he is a rational animal, he is a sensitive living being;
If he is a sensitive living being, he is an animate body;

If he is an animate body, he is a composite substance;

Therefore, if Timour is a man, he is a composite substance.

Or else: Therefore, if he is not a composite substance, he is not a man.

Or else: But Timour is a man;

Therefore he is a composite substance.

This last way of putting the conclusion shows that in the hypothetises sorites, the minor premiss may sometimes immediately precede the conclusion, instead of heading the series of propositions.

(d.) **Dilemma** (or **Trilemma, Tetralemma,** &c., according to the number of its disjunctive members), in which the major premiss is a disjunctive proposition, from each member of which the same consequent is drawn hypothetically in the hypothetical minor premiss (which thus has as many members as there are parts in the disjunction), while the conclusion infers categorically the truth of the common consequent. In other words, the disjunctive major is formed of members opposed to one another in such a manner, that, if one be admitted, the proposition under proof, must be established, *e.g.*, Tertullian says in his *Apology:*

The command of the Emperor, that the Christians are not to be sought out, and that only those are to be punished who are denounced as such, is unjust; because—

The Christians are either guilty or they are innocent;

If they are guilty, the command is unjust, because if guilty they ought to be denounced;

If they are innocent the command is unjust, because if innocent they ought not to be punished;

Therefore, whether the Christians are innocent or guilty, still the command is unjust.

Again, if some presumptuous speculator, calling in question the judgment of the Most High, were to ask, Who on earth knows what becomes of the Malays or Hindoos after death? we may propose to him the unanswerable dilemma:

If, on the one hand, those poor people cannot help breaking the Ten Commandments, as some persons say they cannot, for want of better knowledge, then, depend upon it, they do not go to Hell;

If, on the other hand, they do go to Hell, they go there for doing that which they well knew was wicked, and which they well were able to refrain from doing;

Either way, the justice of the Most High is above reproach.

Such arguments are often called "horned syllogisms," because if any member of the disjunction be admitted, whoever denies the conclusion must be beaten: hence the expression "choosing between the horns of a dilemma."

In all these arguments it is necessary—

(α.) that the disjunction in the major premiss should be adequate or complete;

(β.) that the consequence in the minor premiss should be true, and a necessary conclusion from the disjunction;

(γ.) that the dilemma or conclusion cannot be turned against the arguer by an adversary.

Against the first and second of these rules, Socrates errs when he says:

In death, sensation is entirely lost, as in sleep, or the soul passes to a happier land;

If the first is the case, I shall calmly repose;

If the second is the case, how much more happily shall I live with Orpheus, Ulysses, and all the other celebrities;

Hence in either case it would be expedient or better to die; and therefore, whether sensation is lost as in sleep, or the soul passes to a happier land, it is still expedient or better to die.

Here the disjunction is obviously incomplete, for the possibility of eternal misery is unmentioned; and the consequence drawn is not a necessary one.

Against the third rule the mother offended, who thus urged her son not to undertake any office in the State:

Either you will fulfil it ill, or you will fulfil it well;

If well, you will displease men;

If ill, you will displease God;

Therefore, whether you fulfil it well or ill, you will always displease someone.

To this the son readily retorted:

I shall fulfil the office either ill, or well;

If well, I shall please God;

If ill, I shall please men;

Therefore, whether I fulfil it well or ill, I shall always please someone.

Like every other form of the extended syllogism, the dilemma is really a compendium of syllogisms, of which it contains at least as many as there are members in the disjunctive major premiss. It has sometimes been called the deadly weapon of reasoning; for, when all other arguments fail to convince, a good dilemma being unanswerable, must necessarily at all events close the discussion. To prove whether or not a dilemma is good, we have only to resolve it into its component syllogisms; *e.g.*, suppose that a Frenchman, taken prisoner in China, were offered his life and liberty on the condition that he passed satisfactorily an examination in Chinese theology, after two days' study of an appointed text-book in solitary confinement, he would probably resign himself to failure and captivity, in face of some such argument as the following dilemma, or rather trilemma:

The questions will be set in Chinese theology, either from the text, or from some other book, or from some source of traditional information;

If they are set from the text I shall fail, because I can no more understand the text than I can understand the language of the Potowatomies;

If they are set from some other book, I shall fail, because I know no more of Chinese theology than I have read in the text which I cannot understand;

If they are set from some source of traditional information, I shall fail, because I do not know a single Chinese tradition.

Therefore, whether they are set from the text, or from some other book, or from some source of traditional information, still I shall fail.

This example may be reduced to many simple syllogisms. To begin with the simplest:

The questions will be set in Chinese theology;

I cannot answer what will be set in Chinese theology;

Therefore I cannot answer the questions; in other words, I shall fail.

Upon this we can build three more simple syllogisms, according to the number of members in the disjunction. But each member of the hypothetical minor premiss consists of a causal proposition, or contracted syllogism; and, by expanding each of these, we get three more *bonâ fide* syllogisms: so that our dilemma is reducible to at least seven distinct syllogisms.

CHAPTER VI.

XIV. The act of the agent in relation to its end. XV. Method. XVI. Division of method.

XIV. So far, in considering the "act of the agent" of logic, we have been concerned with the laws on which depends the formal truth, or accuracy of thought, considered purely in itself as thought, *i.e.*, with logical truth, which consists in the correspondence between the thought and the formal laws of thought." But as the end of reasoning, and therefore of logic, consists in the material truth of thought and in the attainment of certainty, we must next look at the order which should be followed if we would attain this end, or—as we may put it—at the necessary link between the act of the agent and the end of that act, or at the act of the agent in relation to its end. This is done in what is called method, and its right to a prominent place in logic can very soon be vindicated. We have seen that Suarez calls it "the proper office of logic to give the means of acquiring true science." Now the means of acquiring true science can be nothing else than the way that leads to it, and in that way, as in every other, there is a starting point, a road to be followed, and a destination. The starting-point is our own mind, or more immediately those mental processes we have been

examining as "the act of the agent;" the road to be followed, if we would reach the destination we have in view, is method; and the necessity of method bears, consequently, an exact proportion to the necessity of its end.

XV. Method then may be defined: the order or process which should be followed by the mind in order to attain its proposed end, *i.e.*, certainty and truth. Hence, in method thought is no longer considered purely for its own sake, but in its relation to objective truth, though we have not yet to do with the matter of the thought which corresponds to the objective truth. Besides telling us the order to be observed by the mind in seeking truth, method likewise teaches us the laws on which the formal accuracy of this order depends in each of its divisions.

XVI. Division of method. In investigating an objective truth, and making it cognizable to the intellect, three things are necessary:

(1.) We must ascertain what the thing really is, which forms the subject of our inquiry; and this is done by **Definition:**

(2.) We must distinguish the parts which constitute the whole of the thing; and in this we have the work of **Division:**

(3.) We have to establish the truth of our assertion by proofs, *i.e.*, to verify or prove the objective truth of the subject of our enquiry; and here we have the function of **Argument,** or more closely of **Demonstration.** It is needless to explain how these three processes correspond to their signs, which we have been studying as the matter and

form of Formal logic, and to the mental processes of which those signs are an interpretation.

(4.) Lastly, Methods treat of **Science** or **Knowledge,** or—more exactly—**Scientific Knowledge,** as the outcome or result of Definition, Division, and Argument or Demonstration, which three processes will be found to comprise the whole operation of the mind in its investigation of truth. Then, as objective truth in its totality is not merely a conglomeration of many separate truths, but as all objective truths form together one inter-connected, comprehensive whole, the mind does not stop at the acquirement of particular truths piecemeal, so to say, but passes on to combine them into a higher or scientific whole; and so method has to deal with the order which should be followed in this combination. Besides all this, it has to determine the laws or rules upon which depends the formal accuracy of this fourfold process. Thus, in the means between the "act of the agent" and its end, we have to consider Definition, Division, Argument or Demonstration, and scientific knowledge as such.

CHAPTER 7.

XVII. Definition. XVIII. Rules for definition.

XVII. Definition. To define is, according to its derivation, to circumscribe within limits; and so, to define a thing is to circumscribe it within limits in such a manner that it may stand out clearly and distinctly from all other things; whence definition may be called a clear exposition or explanation of that which is the subject of investigation, or a precise statement of the qualities which are just sufficient to mark out a thing or class. Exposition or explanation may be taken as a sort of generic term including the various kinds of definition, which all fall within its extension, while severally exceeding it in intension. Now, we can explain either words or things, and thus definition is primarily either nominal or real.

(1.) **Nominal,** *i.e.*, of words, of which it explains (a) either the etymology or derivation, *e.g.*, philosophy=love of wisdom, method=way following after, sorites=heaped up; (b) or the ordinary use in common parlance, *e.g.*, by the name sun we understand the star which is the centre of our system, and regulates our days and seasons, by the name winter we understand the coldest months of the year; (c) or the use in particular cases, *e.g.*, *Mercury* as the name of some particular vessel, the

Spectator as the name of a leading literary paper, *Vice-versâ* the name of Anstey's famous story.

(2.) **Real,** *i.e.*, a definition which explains, not the word, but the thing itself implied by the word, and which shows what the thing is in answer to the question, What is it? thus clearly distinguishing it from all things else. A real definition may be either descriptive, genetic, or essential.

(a) **Descriptive,** *i.e*, one which answers the question **quid sit** by painting a clear picture of the thing, and distinguishes it from all others by explaining or depicting its qualities whether proper or accidental, but does not penetrate to and show its essence, *e.g.*, man is a civil, political, religious animal endowed with speech; James is a strong, tall, dark-haired, athletic-looking fellow; in *Troilus and Cressida* Shakespeare thus paints for us the youth of Greece, "The Grecian youths are full of quality; they're loving, well composed, with gifts of nature flowing, and swelling o'er with arts and exercise;" and Virgil gives the following descriptive definition of Polyphemus:

Monstrum horrendum, informe, ingens, cui lumen ademptum,
Trunca manum pinus regit, et vestigia firmat.

Clearly enough, these are no definitions, properly so called; they do not go beyond description; but of things whose essence is either not known or has not yet been formulated, description is all that we can give, and in other cases it prepares the way for exact definition. Descriptive is often called Physical Definition because the definitions of Physical Science do not generally express the essence,

but are a synthesis of the accidents which are properties of a class. Such, for instance, would be to define sodium as a silver-white metal, soft at ordinary temperatures, melting at 95·6°, volatilizing, and yielding a colourless vapour below a red heat; its combining weight being 23, and its specific gravity 0·97; or to call liquefaction, the passage from a solid to a liquid state; and sublimation, the conversion of a solid into a gas.

(b.) **Genetic,** *i.e.*, a definition which explains a thing by describing its origin, or the way it is produced, or how it is formed from its components, *e.g.*, an eclipse of the moon is occasioned by the earth passing between the sun and the moon; a circle is made by drawing from a given point a circumscribing line, each part of which is at precisely the same distance from the given point; manganese monoxide is a greenish powder obtained by heating the carbonate in absence of air. Though not strictly speaking definitions, because they do not show the essence of the thing, these genetic definitions have nevertheless a better claim to the title than have those of the simply descriptive class, inasmuch as they usually show more clearly what the thing is, and distinguish it from all things else, and sometimes directly lead up to essential definition.

(a.) **Essential,** *i.e.*, a definition which explains a thing by showing what are the principles that constitute its essence; whence it may be defined, an exposition of the constituents of the essence of the thing. This is *bonâ-fide* definition; for by giving the essence, *i.e.*, "that which makes the thing what it is," it answers the question *quid sit* in the

only satisfactory way possible. Hence, an essential definition is the only kind of real definition, in the strict or exact sense of the term. But the essence of the thing is comprehended in the idea or concept representative of it; and therefore from a subjective point of view essential definition may be called conceptual definition, or an exposition of the essential matter of the idea or concept. The reason is obvious. Such a definition expresses in the first instance the essential constituents which form the concept, and consequently formulates *eo ipso* the essence of the thing represented by the concept.

It may be useful to note parenthetically that, as the same object may be viewed under various subjective aspects, two or more essential definitions of the same thing may be equally good, yet not identical in form. For instance, from a metaphysical point of view in which my definition is a synthesis of the matter and form of the object, I should define man as a being formed of an organic body and an intellectual soul; the body being the matter, *i.e.*, that element which is in itself indeterminate but is capable of receiving determination from another, and the soul being the form, *i.e.*, that which determines the indeterminate matter, or in other words makes it what it is. From a logical point of view, in which my definition is a synthesis of the genus and differentia which constitute the species, I should define man as a rational animal, or still more logically as an animal rational. Both these definitions are an exposition of the essence of the thing represented by the concept. The difference between them lies

in this, that the metaphysical definition regards the constituents of the essence, *i.e.*, soul and body, as possibly separable, though actually inseparable; whereas in the logical definition the constituents of the essence, *i.e.*, the animal and rational elements are separable only in thought and not in fact, because the intellectual soul is the principle of both.

Now, as every logical definition expresses the components of the concept, and as these components consist of the genus and differentia constituting the species of the object, it is clear that the essential components of every logical definition must be the proximate genus and ultimate differentia of the matter of definition, and nothing else. The *proximate* genus, be it remembered, not any genus higher up in the scale. To define man, for instance, as a rational substance, or a bear as a plantigrade body, would not be to express the essence, and so would not be an essential definition, though cases of this kind might sometimes pass for description. But, by showing what the thing defined has in common with some other things, viz., its proximate genus, which implicitly contains every superior genus up to the *genus supremum*, and what differentiates it, viz., the species, an essential definition forms a sort of compendium of all the knowledge that can be gained concerning the thing as such.

Although every essential definition is really the last link in a chain of definitions, inasmuch as we can mount up through the definition of a series of generic terms to the *genus supremum*, yet the fact of there being a *genus supremum* shows that we cannot

go on defining by genus and species *in infinitum.* Why? Because the defining term in every defining proposition, *i.e.*, the predicate expressing the proximate genus and differentia, is representative of a composite concept corresponding to the composite essence of the thing defined. But, ascending in the scale of genera, we come at last to a genus which includes all the sub-genera, and cannot itself be differentiated. This is the *genus supremum;* and, if it cannot be differentiated, the concept corresponding to it cannot be composite; if not composite it must be simple; and hence the simple concept must be the limit of logical definition. For instance, if I define man as a rational animal, animal as a sensitive living being, living being as an animate body, body as a composite substance, I am stayed from further definition by my simple concept of substance, *i.e.*, being which exists in itself, as opposed to accident, *i.e.*, being which necessarily inheres in some other. These two genera, substance and accident, divide all being, which as transcendental includes and goes beyond or transcends everything. Hence, of being, substance and accident, and of some other things which do not enter into the province of logic, it is impossible to give any definition; but it need hardly be said that they can be to some extent explained and described; while no one will question that explanation of the indefinable is immeasurably more difficult than definition of the composite.

As definition is limited from above by substance and accident as all-embracing genera, so is it limited from below by individuals and single instances of

fact. Again, why? Because the concept representative of the species must be universal; if universal, it can be applied to many things; if applicable to many things, it cannot be confined to any one thing. Further, the species cannot become a subgenus when the concept excludes the addition of any determining differentia, as, *e.g.*, in man: a Zulu is a rational animal, so is an Englishman; different as they are, the difference is not essential: so in that category it is evident that definition cannot take cognizance of individuals. Here, however, description comes in to perfect the work of definition, and to distinguish the objects of definition by depicting their properties and accidents, *e.g.*, the battles of Cannae, Platea, and Waterloo were all alike in being battles; but, waiving for the moment the question of causes and effects, description will tell us how they differed.

XVIII. Rules which ensure the **formal accuracy of definitions.** A definition should be:

(1.) **Adequate and exclusive**; in other words, it must include all, and only, those objects which it can define: hence it should be neither more nor less comprehensive than the thing defined, *e.g.*, to define Logic as "the science of the laws of formal thought," would be an insufficient definition, for it would not include the whole of Logic; and to define meteorology as the science of storms would be to exclude many of the most important things taught by meteorology. On the other hand, to define planet as a heavenly body, would be to give too wide a definition, for there are other heavenly bodies besides planets; and a like fault would be committed

in defining fortitude as a good quality, for good is far from the ultimate differentia.

(2.) **A thing must not be defined by its own name,** nor by any word **derived from or equivalent** to its name. This would be to induce a vicious circle, of which more anon. Logic, for instance, must not be called "the science of the laws of Logic, or of logical laws;" nor can arithmetic be defined as "the science of arithmetical processes."

(3.) A definition must be **clearer than the thing defined.** Otherwise it would not answer its end, which is the elucidation of the thing. Hence we should not in definitions make use of obscure, double meaning, or merely metaphorical expressions, *e.g.*, when Burke calls law "beneficence acting by rule," he uses a very true metaphorical expression, but we must not mistake it for a definition; and the same may be said of the well known aphorism of Novalis, that "character is a completely fashioned will."

The quality of clearness is, however, relative, for we cannot expect philosophical definitions to be self-evident to uneducated minds; and it would be a mistake to reject good definitions because they are not apparently easy of comprehension, and to fix instead upon others which, though possessing a fallacious clearness, are neither philosophical nor true.

(4.) A definition **should not be negative.** For a merely negative definition does not explain what the thing is, but what it is not; and hence must always have greater extension than the thing defined, *e.g.*, we cannot define man by saying he is not a pure spirit, for many things besides man are not pure spirits;

nor can we define a beast by saying that it is not a rational animal, for this is true of all things excepting man. Only when its contrary has been positively defined, or when we are leading up to such definition, may we define a thing negatively; and the negative definition has merely this value, either that by its means the way is prepared for positive definition, or that the positive definition is more strikingly told out. As an instance we may name the passage in Cardinal Newman's *University Lectures*, where he answers his own question, "What is Theology?" by saying "what it is not," before passing on to tell us "what it is." Thus, too, after defining "compound or composite," as that which is formed of parts, I can at once define "simple" as that which is not formed of parts.

(5.) A definition should **be short and exact, or distinct**; it should avoid prolixity, and express the genus and species in as few words as possible, as far as this can be done without detriment to its distinctness. Definitions formulated in long involved sentences should always be avoided; it will usually be found that inexactitude, obscurity, and prolixity involve violations of rules other than that which draws attention to distinctness and precision.

CHAPTER VIII.

XIX. Division. XX. Rules for division.

XIX. Division, as its name implies, is the distribution of a whole into its various actual or conceivable parts, regarded from a given point of view. It is, as we have seen, presupposed in every definition, as the necessary analysis preceding synthesis; and its value has been strikingly estimated by Plato, who says,[1] "If I were to meet with a leader who knew how to divide rightly, I would follow his footsteps as those of a God." In every division, then, we have (1.) **a whole to be divided,** (2.) a given point of view from which the whole is considered in its division, *i.e.*, **a ground or basis for the division,** (3.) parts into which the whole is divided, *i.e.*, **members of the division.**

(1.) **The whole** to be divided may be either actual, potential, or moral.

(a.) **actual,** *i.e.*, one whose component parts form its substance or nature; man, *e.g.*, is an actual whole as composed of body and soul, which are the components of his nature. Partition is the name usually given to the division of an actual whole; it may be either physical, metaphysical, or logical. A whole is called **physical** when its parts are separable, as are, for instance, body and soul;

[1] *In Phæd.*

metaphysical, when the parts are really distinct, yet not separable, *e.g.*, the soul of man which possesses powers and faculties really distinct from each other, but inseparable either from the soul or from each other; **logical** when a thought, which is a simple act, is the matter of analysis, *e.g.*, a statement or judgment as composed of its matter and form, *i.e.*, two terms and a copula; or a composite concept, or the subject of a discourse or treatise. As thought is a simple act and therefore indivisible, we do not, of course, in a logical whole, attempt to regard "parts" of thought, but the signs by means of which we reflect upon our thought, and which our minds apprehend as its "parts," in order to make such reflection possible. In other words, we think of thought, which is itself simple, as composite because, if we go below the most surfacial of surfaces, we cannot in our present imperfect state conceive of a simple whole. In Heaven all this will be very different.

(b.) **potential,** *i.e.*, a whole whose parts are not the components of its substance or nature, but of its extension; and so are comprised in the whole, not actually but potentially. Every universal term is therefore a potential whole, in so far as it comprises as a whole a number of members, to which it can be applied. Thus every genus is a potential whole with regard to its species, and every species with respect to the individuals comprised under it; *e.g.*, animal is a potential whole comprising man, beasts, birds, fishes, &c. The division of potential wholes is division in the exact sense of the term, in contradistinction to partition and distribution, and is

formed according to the parts of the extension.

(c.) **moral,** *i.e.*, a whole whose component parts are independent beings formed by some external principle into a collective unity, or rather union, *e.g.*, an army is a moral whole, for though the soldiers are united as members of one body, this union has only a collective character. As distinguished from the partition of actual, and the division of potential wholes, the division of moral wholes is termed distribution. The division of an army into brigades, regiments, battalions, &c., is a distribution; so is the division of the college into schools, of a congregation into various establishments.

From considering the chief kinds of wholes, we now pass to

(2.) **The basis of division.** This may be either internal or external. It is internal when we consider the inner specific nature; external when we make our division from a merely outward aspect of the properties of the whole, *e.g.*, in dividing living being into plants, animals, and men, and in dividing the cardinal virtue of fortitude into active and passive fortitude, the basis of division is internal or intrinsic; but it is altogether external in the Linnaean system of botany, and in the classification of a set of boys according to height. Moreover, whatever kind of a whole we may have, it is possible that it may be regarded from many points of view; and hence there may be many and very different bases for the division of the same whole; and thus we get many divisions which are not interconnected, or subordinate one to the other, but are strictly co-

ordinate and independent. Illustrations of this may be found in the division of terms and propositions (*q.v.*), and they are not difficult to meet with elsewhere. If I am writing an account of the Thirty Years' War, say, I may divide the period arbitrarily according to time into three decades, or I may mark it off according to certain distinctive notes into the Palatine, Swedish and Danish periods, or I may divide it by its chief battles, or by the alternations of Catholic and Protestant ascendancy, or in some other way. A class of boys I may divide into talented, mediocre and slow members, or into models and scapegraces, or into reliable and non-reliable students.

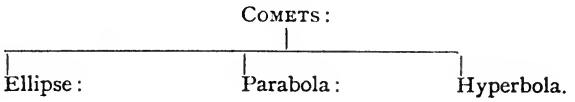
(3.) **The members or parts of the division,** to which apply nearly all the coming rules for division, may in their turn be divided ; and these subdivisions may likewise be regarded as wholes, and cut up into further divisions ; and so on through an interdependent series, by means of which we can see the whole in all its parts and in their mutual relations. Every subdivision is obviously subordinate to the division from which it is made, *e.g.*, wholes are divided into actual, potential and moral, while actual wholes are subdivided into physical, metaphysical and logical. Church history may be divided into periods of three hundred years, and each of these periods may be subdivided, and these subdivisions call for further division, and so on till our history is pretty fully mapped out.

XX. Rules for Division.

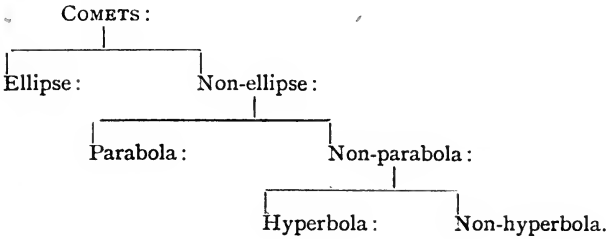
(1.) **The division must have a basis or founda-**

tion; for without it logical division would be impossible.

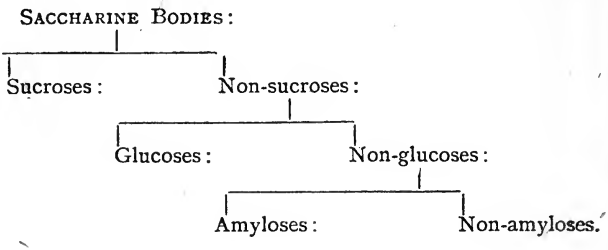
(2.) **It must be adequate and exclusive,** *i.e.*, it must contain every part of the whole, and only its parts. To secure this, the most logical way is to divide our whole or genus into two species only, one of which indicates a differentiating property, which the other denies, *e.g.*, if I classify comets according to their orbits:



It may be objected that it is not impossible for a comet to have, say, a circular orbit; but I can get out of every difficulty of this sort by stating my division thus:



It is evident that I have room here for every kind of orbit; and, if the next comet should happen to have a circular orbit, I can draw it or any other novel kind from my non-hyperbola. And, if I wish to make a perfectly good classification of saccharine bodies, I should state it thus:



But, if I divided all saccharines into sucroses, glucoses, amyloses, and glychol, my division would not be exclusive, for it contains something, viz., glychol, which is not a part of the whole, viz., saccharine. And, on the other hand, if I divided it into sucroses and glucoses only, my division would not be adequate, because it does not contain amyloses, which is a part of the whole.

(3.) **The parts of the division must be strictly co-ordinate:** hence no one of the parts can equal the whole, and no subdivision can stand in co-ordination with a primary division, or with any division higher or lower in the scale than itself, *e.g.*, suppose a school to be divided into six forms, and the first of those forms into two divisions, it would be logically inaccurate to speak of the division of the school as—first and second division, and second, third, and fourth form, for first form comprises first and second division, which are its subdivisions, and so are not co-ordinate with second, third, and fourth form. Similarly, to speak of Schiller's *Wilhelm Tell* as consisting of four Acts and the last three Scenes, or of Shakespeare's *Hamlet* as containing four Acts and two more Scenes, would be to give a faulty division, for in

each case the specified scenes constitute the fifth Act, which should be named in their stead.

(4.) **The parts of the division must mutually exclude each other,** *i.e.*, no one may be either partially or wholly contained in another. Thus, in the same division, I cannot divide Scotland into the Highlands and Lowlands *and* thirty-three counties, for the main division of Highlands and Lowlands includes the counties. Strictly speaking, this rule is not much more than an extension of the last. In some cases indeed, it is practically impossible not to violate it in the minor divisions of a classification; *e.g.*, in making a library catalogue, I may divide the books into those which treat of History, Biography, Science, Literature, Language, Geography, Art, Religious Questions, &c., &c.; but, however carefully I may make the classification, there will certainly be books in one class, which might equally well belong to another. Where shall I place a "Biographical History of Literature," for instance? It belongs alike to the History, Biography, and Literature divisions; and, if it should happen to be written in Russian or Chinese, why should it not rank under Language?

(5.) **The division must be regular or orderly.** This rule applies chiefly to subdivisions, which should be formed from the division next above them, so that there may be no break in the series of subdivided parts; *e.g.*, it would be incorrect to divide Logic into the matter of the act of the agent, and its form; for the primary division of agent, act, and end, which furnishes the whole, is ignored. In the same way, to divide the compounds of arsenic into

arsenic trioxide, arsenic peutoxide, arseniuretted hydrogen, arsenic disulphide, trisulphide, and pentasulphide, would be to leave out of count the previous division into oxides of arsenic, arsenic and hydrogen, arsenic and sulphur.

(6.) **Division should be short and simple**: hence it should be neither too comprehensive nor too detailed; otherwise, instead of furthering and elucidating a survey of the divisible whole, it will only render it laborious and puzzling. Labyrinthine subdivisions divert the mind from the main point, fix it upon minute details, and induce the very confusion they were intended to correct. Seneca says: "A thing divided to dust is as good as confused."

CHAPTER IX.

XXI. Argument. XXII. Demonstrative arguments. XXIII. Rules for demonstrative arguments.

XXI. Argument or Demonstration. After having defined the subject of our inquiry, and divided it into its component parts, the next step is to establish the truth of our assertion through the medium of principles or grounds. This is done by argument, or demonstration in the wide sense of the word, and its end is to verify objective truth, and make it certain to our minds. The value of an argument in establishing Truth and Certainty depends entirely upon its force and the degree of evidence it exhibits, which may be either convincing

in various degrees, or the reverse. From this point of view, all arguments fall into two great classes, viz. (1.) **Certain or Demonstrative,** in which the evidence is in itself convincing; and (2.) **Probable or Doubtful,** in which proofs are merely probabilities, and therefore are non-convincing. It is obvious that, of these two classes, only the first can be called demonstration in the strict sense of the word.

XXII. A Demonstrative Argument or **Demonstration** strictly so called, is the deduction of the truth of a proposition from another proposition already known and recognized as true; and this deduction is accomplished by means of the syllogism, with which we are already familiar. Going back upon our knowledge of it, we see then that the basis of all demonstration must be the axiom that "Truth contains nothing but the true." Consequently, whatever necessarily follows from a certain truth must certainly be true; if a truth could contain false consequences, it would *ipso facto* cease from being truth. Consequently again, because "Truth cannot oppose what is true," whatever either contradicts or is contrary to a certain truth, must certainly be false. Of two contradictories, we remember, one must necessarily be true and the other false; and, as two contraries cannot both be true at once, if one is true, the other must be false. To get a clear idea of Demonstration, we must distinguish at the outset between its Matter and its Form.

As the **Matter** of every argument, we have first of all something to be proved, and this is called the

thesis or **proposition,** which is specified as a **theorem** if it is of a theoretical nature, and as a **problem** if its character is practical. The main point at issue, defended or opposed by several theses, and usually stated in interrogative form, is known as the **Question,** and the elucidation of the main theses and their dependencies and sub-dependencies is called generically the development of the **State of the Question.** Then there is something by means of which the thesis is proved, and which is called the **principle** or **ground** of demonstration. It may be either **immediate,** *i.e.,* when its truth is at once evident to the mind without proof (*principium per se notum,* which when of a theoretical nature is called an axiom), or **mediate,** *i.e.,* when its truth has to be made evident by proof. In this case, the principle of demonstration consists of an agreement used as the *principium demonstrationis* in the agreement based upon it, and it should be either already itself proved, or at least provable. If not actually proved, it is really assumed, and as such is usually termed a postulate. Then we have the syllogism, by means of which the thesis is deduced from the principle of demonstration, and which, we know, may be either simple or compound, thus furnishing either a simple or many-linked argument.

In contradistinction to its threefold Matter, the **Form** of Demonstration, or that which makes it what it is, is the **necessary consequence** of the thesis from the principle of demonstration. Only where there is such a consequence can there be an argument, for on it rests the truth of the deduction.

Lastly, it must be noted that Demonstration is

essentially dependent upon the *principia per se nota*, without which argument would virtually be impossible. The reason is this. If every proposition taken for the ground of demonstration, required proof, we should go on seeking it for ever, and our argument would never come to an end, and consequently would cease to be an argument. We had a parallel case in treating of definition. Just as definition would be impossible unless it started from, or—as we regard it—led up to indefinable concepts, so would argument be impossible unless primarily based upon, or—from our point of view—leading back to indemonstrable propositions neither requiring nor admitting of proof. Such propositions are either indemonstrable truths of the reason, which form the limit of argument from above, and will be treated of later on, and indemonstrable facts of internal and external experience, which limit argument from below. What need is there to prove, or indeed *how* can I prove by argument that I am thinking what example will suit my present point, that I am writing at a wooden table, and hear the sound of merry boys' voices in the playground?

So much for Demonstration in general. Before examining its divisions, which might be the next step in our inquiry, we will look at the

XXIII. Rules of Demonstration, or the Demonstrative Argument, which relate (1.) to the **thesis**; (2.) to the **principle or ground of demonstration**; (3.) to the **syllogism**, as the instrument of argument, and are the following:

(1.) The rule for the **thesis** is that its sense should be so **clearly determined,** that nothing else

may be proved but what has to be proved. Hence, before beginning an argument, the state of the question should always be sufficiently explained and set out clearly. Especially is such explanation necessary when, without it, the thesis might have many meanings, or be otherwise obscure; and it stands to reason that the explanation should be adequate and most lucid.

(2.) The **principle of demonstration** should be

(a.) **true and certain,** for what is doubtful and uncertain cannot be a basis of proof. This rule applies chiefly to objective arguments, but it must not be violated in subjective arguments *ex concessis* (q.v.).

(b.) It must be **acknowledged as true and certain** before it can become the ground of the argument, or basis of proof.

(c.) It must be **better known than the thesis,** otherwise it cannot answer its end of proving or elucidating the thesis.

(d.) Finally, it must be **quite distinct from the thesis,** for it is the principle by which the thesis is made known. Hence it should not express the same thing, nor have the same nature as the thesis.

(3.) Lastly we come to the rules for the **syllogism** considered as part of the argument. First of all, there must be **no violation of the laws and rules for the syllogism** (q.v.); and, secondly, **all its parts must be in themselves true.** To put it shortly, the syllogism, or series of syllogisms, must, in their whole extension, be both formally and materially true. In this respect, therefore, all the rules for the formal and material truth of the syllogism

apply with equal force to the argument. In direct opposition to the three classes of rules for the argument, stand fallacies or sophisms.

CHAPTER X.

XXIV. Fallacies or Sophisms.

XXIV. Fallacies or Sophisms are errors or mistakes in reasoning that mislead or deceive, and may be defined, arguments which appear to be regular, but are not so really. Hence a sophism does not consist in a false opinion, but in the bad reasoning or faulty argument by which it is reached. Sophisms are treated of next after the rules for the argument, because—after seeing how we are to do the right—it is natural to look how we or our opponents may get wrong, and because all sophisms may be included in classes corresponding to the division of these rules, inasmuch as they violate the laws laid down for the accuracy either of (1.) the **syllogism,** (2.) the **thesis** or (3.) the **principle of demonstration.** Sometimes sophisms are divided into **logical or formal,** *i.e.*, reasoning wrongly from right premisses; and **material,** *i.e.*, reasoning rightly from false premisses. Though this division is not here adopted, the letter F will indicate formal, and the letter M material sophisms, as they occur in the classification chosen.

(1.) **Contrary to the rules of the syllogism** are the sophisms of,

(a.) Amphibology or Ambiguity—F.
(b.) Composition and Division—F.
(c.) Collective and Distributive meaning—F.
(d.) Passing from a "dictum secundum quid" to a "dictum simpliciter"—M.
(e.) Fallacia accidentis—M.
(f.) The false cause.—M.

(a.) **Amphibology** or **Ambiguity** is a fallacy occasioned by using a word of two or more meanings, sometimes in one, sometimes in another of these meanings during the course of the same argument. The way to unmask this, is to distinguish the meanings in the premisses: *e.g.*

No one smiles but man;
This meadow smiles;
Therefore this meadow is a man.

The fault really lies in putting more than three terms into the syllogism. In the major premiss of our example the middle term *smiles* is taken in its ordinary meaning, whereas in the minor term it is used analogically. Again, the agnostic uses a fallacy of ambiguity when he says; "that which becomes a cause has passsd beyond its former bounds," and uses this assertion to support the thesis that the Absolute and the Infinite cannot be the First Cause, in other words that, if there is a God, He cannot be the Creator, stated as a syllogism, it would stand thus:

A cause in becoming a cause passes outside its former bounds;
But in the Act of Creation God becomes a Cause;

Therefore in that Act He has passed outside His former limits.

But this is impossible; and hence God the Creator is an impossible being.

Now the word cause is here used ambiguously. In the major premiss it is applicable to created causes only; in the minor to the uncreated cause; so we must confront the false conclusion with an emphatic *distinguo*. And *distinguo* too we must say to the coachman, who having heard his master tell a friend that certain conveyances were under lock and key at his office, and that it had been horse-work to get them drawn up by a specified date, concluded that the lawyer had become somewhat disordered in his intellect if he could make such an assertion. "Conveyances" to the serving-man signified only the contents of the coach-house, and possibly "horse power" was identified in his mind with horses; certainly he did not know that the legal deed, by which property is conveyed from one person to another, is termed a conveyance.

(b.) **Composition and Division.** This fallacy consists in using words in a composite sense, which are only true in a divided sense, that is to say, to infer that two predicates cannot be affirmed of a subject successively because they cannot be affirmed of it simultaneously, *e.g.*,

It is impossible that one who is awake should sleep;

But "Brother Jonathan" is awake;

Therefore it is impossible that "Brother Jonathan" should sleep.

The opposite fallacy, that of Division, is to use

words in a divided sense, which are only true in a composite sense, *i.e.*, to conclude that because two or more predicates can be affirmed of a subject successively, they can, therefore, be affirmed of it synchronously, *e.g.*

It is possible for one who is sitting to walk;
But Hecuba is sitting;
Therefore she can walk while she is sitting.

The fault lies in inferring in the conclusion what is not in the premisses, in violation of the second rule of the syllogism. The way to unmask this fallacy is to test it by the rules of the conjunctive syllogism.

(c.) The fallacy of **Collective and Distributive** meaning consists in using a term in any argument first in a collective, and then in a distributive sense, or *vice-versâ;* thus giving four terms instead of three to the syllogism. As with the fallacies of ambiguity, we must distinguish the meanings in the premisses, *e.g.*,

The Apostles preached the Gospel to the whole world;
But James was an Apostle;
Therefore James preached the Gospel to the whole world.

Here "Apostle" is just used collectively and then distributively. It would be a similar fallacy to say that every soldier in the Greek army put one hundred thousand Persians to flight, because the Greek army (combined) did so;

(d.) The fallacy of **passing from a "dictum secundum quid" to a "dictum simpliciter;"** or *vice-versâ*. This is done when from a major premiss,

which is only true with certain limitations, or under given conditions, a conclusion is drawn without regard to such limitations or conditions; *e.g.*

What you have not lost you have;
But you have not lost £2,000;
Therefore you have £2,000.

Now, in this example, the assertion in the major is only true with the limitation, that you already possess what you have not lost; but the conclusion is drawn without reference to any such limitation. As an instance of the same case we may take:

At your Latin lesson to-day, you say what you studied yesterday;
But you studied decimal fractions yesterday;
Therefore you have decimal fractions at your Latin lesson to-day.

In the major, "the Latin you studied" is evidently implied, but no such circumstance is recognized in the conclusion. The reverse of this is, from a major premiss, which is only true when stated without limitation or condition, to draw a conclusion which could only be true if the major were limited or conditioned; *e.g.*

You will read to-day what I wrote yesterday;
But you will read the history of De Rancé to-day;
Therefore I wrote the history of De Rancé yesterday.

In both forms of this fallacy, the fault lies in inferring more in the conclusion than is contained in the premisses; and the error must be called from its lurking place by a prompt *distinguo*.

(e.) **Fallacia Accidentis.** This fallacy occurs

when, from the fact of individuals belonging to any species, it is inferred that they are necessarily endowed with some property or capability, which belongs to the species not essentially but only *per accidens;* or when, from seeing a thing, that is good in itself, frequently misused by many persons, we come to consider the thing itself evil, and so condemn the good with the bad; *e.g.* Among lawyers there are many pettifoggers; hence every lawyer is as such a pettifogger. Philosophers have already done much harm in the world by means of philosophy; therefore philosophy in general is calculated to cause harm. And Rousseau uses a *fallacia accidentis* when he says: "Science and literature have produced much evil; therefore they are evil." At the two poles of human society—saints and rapscallions—a frequent basis for practical argument is the proverb, "What man has done can be done by man"; but it is in point of fact merely an instance of the fallacy we are considering. A sickly inmate of St. Thomas's Hospital might conclude, for instance, that being a man he can, like the Stylites of old, live on the summit of a pillar, and proceed in consequence to rear for himself some such singular place of abode, say, in Regent Circus or St. James' Park. Would not the authorities civil and medical speedily furnish him with a certificate of lunacy? And some priggish ignoramus might contend that, men having written the *Summa Theologica*, the *Principia*, the *Grammar of Assent*, and *Metaphysics of the School*, all men can write books equally profound and closely reasoned, and therefore that such undertakings are within

the limit of his own capabilities, while in reality he perhaps represents the very apex of sciolism. Again, the socialist is only putting the same premiss into different words, when he urges that "What man has belongs to man," and therefore that the rights of property do not exist; that, if honour is paid to one, it is the right of all; that, if authority is vested in a few, it should be extended equally to all, which simply means that it must be reduced to *nihil*. Some of the Temperance Tracts published are filled with sophisms of this and the class that will next be considered. From seeing that the excessive use of alcohol is evil, many people conclude that alcohol itself is evil, which is a hardly more rational conclusion than it would be to assert that study *per se* is evil, and to be avoided, because excessive study has weakened some few intellects and impaired some constitutions. A very striking instance of the *fallacia accidentis* occurs in a book called *Natural Religion* by the author of *Ecce Homo*, who thus seeks to disprove the Personality of God: "Personality, as we know it, involves mortality. Deities are usually supposed immortal. Personality involves a body. The highest theologies have declared God to be incorporeal." Here we have muddled up the essence of personality with two accidents which happen to accompany it in man as he exists on earth. It would be about as reasonable for a Red Indian to say that, all personality, as I know it, implies a red skin; hence God must be red. From the examples given it will be readily seen that the fault lies in arguing from particular cases to a general one, when we have no right to attribute the

quality or property in question to the essence or specific nature of the individuals in question.

(f.) **The false cause, or non causa pro causa,** is a fallacy which consists in adducing a mere antecedent as though it were a cause, according to the old sophistical adage, *post hoc ergo propter hoc*, when there is no sort of *nexus* between them beyond that of temporal or some other sort of accidental sequence; *e.g.*, the fall of the Roman Empire followed the establishment and spread of Christianity; therefore the foundation and spread of Christianity was the cause of the fall of the Roman Empire. The appearance of a remarkable comet preceded the fall of Constantinople; therefore it caused the fall of the city. The prisoner at the bar passed through St. Pancras' Station half an hour before the dynamite explosion took place; therefore he left explosives in the Station. The fault in all these cases is easy to detect, and lies in nothing else but in basing the argument on the supposition that, if one thing follows another, the first must be the cause of the second, merely because it comes before it. Meteorologists tell us that people, who believe in the unvarying influence of the moon upon the weather, fall into this fallacy, when they attribute changes in the weather to the moon having entered upon a fresh phase; and that it is much the same thing to attribute exceptional cold to brilliant displays of the Aurora borealis.

(2.) Contrary to the rules of the **thesis** are the various sophisms classed under the

Ignoratio or **Mutatio elenchi,** (M.) when the question is evaded by tacitly ignoring or misrepresenting it. This is done by proving the wrong con-

clusion, that is to say, a proposition which—by more or less resembling the question—is likely to be mistaken for it. **Elenchus** is the name given by Aristotle to the contradictory of our opponent's statement, and this contradictory must be proved in order to refute him, successfully. The fault lies in violating the rules for proving the contradictory of propositions; and is distinguished as **Ignoratio** when committed unknowingly, and as **Mutatio elenchi** when committed designedly. The ways in which a question may be thus evaded are very various. Sometimes a meaning different from its real one is assigned to the thesis; and so a point is established quite different from the one which should have been proved; *e.g.*, suppose the thesis for proof to be, that man is free in so far as he is able to choose and decide in his actions; and instead of this it is proved that he is free in the sense of living under and being responsible to no law. And, if we argue that the Second Person of the Blessed Trinity, being God, must be eternal; yet, having been born in time, cannot be eternal; and therefore is eternal and not eternal; which is impossible; and hence, because He must be either the one or the other, He is either not eternal, and consequently not God; or he is eternal, and consequently not man; we are giving a false meaning to the thesis, which regards only the Nature of the Second Person of the Blessed Trinity while the conclusion not only refers to two but gets on the wrong track by assuming their union in one Person to be an impossibility.

Sometimes in refuting an opponent, something is proved which he did not deny, or something is

disproved which he did not assert; *e.g.*, when the Port Royal ladies were charged with Jansenism, they said they were not Jansenists but religious. This was clearly evading the question about as rationally as did the Irishman who, when charged with being drunk and disorderly on the evidence of five witnesses who had seen him so, proposed to call fifty witnesses who had not seen him. To prove what is not denied, and to disprove what is not asserted, are common practices in law courts, where they are often effectually used to produce a prejudice. A bank clerk, for instance, or a lawyer's cashier, pleads guilty to a charge of embezzlement; but urges in extenuation that he has been exposed to great temptation, misled by bad companions, and induced by the poverty or misery of his home to commit crime. In such a case, the counsel for the prosecution will, nine times out of ten, ignore the point in question, viz., whether the circumstances adduced extenuate the prisoner's guilt, and insist upon what is not denied, that he has actually committed the crime, and so must have been dishonest. Not many years ago, when two landlords went to law about the proprietorship of a small stream, which for some distance divided their respective estates, the counsel for the defence effectually created a prejudice and virtually determined the verdict by proving that in the title deeds of the defendant's estate there was mention both of the stream and of its name, while neither could be found in those of the plaintiff—a point which had never been asserted, and which—when the case was taken to a higher court—proved quite beside the question.

Sometimes again, this fallacy takes the form of proving too much or too little,—which is, in point of fact, to misrepresent the question. In proving too much, people draw from an argument not merely the conclusion which formed its thesis, nor further conclusions legitimately drawn from it, but other consequences which are false and often absurd; this, for instance, is what the materialists do with their assertion that the brain is the thinking principle within us, when they say: thought is dependent upon the brain; hence the brain itself is that within us which thinks. Now this is clearly to prove too much; for it would follow that in every case in which one efficient cause was dependent for its action on another efficient cause, the principle of this action would be the cause on which the immediate efficient cause of the action was dependent: this illustration shows the force of the saying: he who proves too much, proves nothing. Too little is proved when part of the thesis is suppressed; and though the conclusion may be true of that portion which has been made the matter of argument, it cannot be true of the thesis as a whole, and so cannot be brought forward at its conclusion; *e.g.*, if anyone, in proving free will, made use of an argument from which could be inferred only part of that freedom, it might be quite true with reference to that part, but it would be valueless as a proof of the whole of the thesis. So again, if I had to prove that a class of ten boys had passed their examination, and I only proved that some two or three had done so, I should be proving too little, and evading part of the question, and, if I had to prove to an

anxious parent that his boy had been eminently successful, and I wandered away into proofs of the eminent success of every boy in the College, I should on the contrary, be proving too much, to say nothing of making myself a very decided bore.

A further way of evading the question, and proving the wrong conclusion is, in weighing alternatives, to keep out of sight those that we have some interested motive in ignoring, and to rest our argument on those that coincide with our views. Suppose, for instance, a young fellow wants to go to sea, and asks his father whether or not such a course would be advisable for him. We will suppose the father to be a confirmed landsman, intolerant of salt water and her Majesty's navy in general, and of her Majesty's midshipmen in particular. In ninety-nine cases out of a hundred, such a man would bring forward a whole litany of objections against his son's wish, and think that the force of the objections should prove that he ought to abandon it. Here we have nothing but an *Ignoratio Elenchi;* for the point proved is, merely that there are weighty objections against the plan; while the point that ought to have been proved is, whether there are more weighty objections against its adoption than against its rejection, or *vice-versâ*, *i.e.*, whether the arguments in its favour outweigh those adduced against it. Similarly, people of every shade and degree of prejudice, are apt to keep out of sight, or at any rate to under-estimate every alternative which clashes with one of their foregone conclusions. A report is set in circulation to the discredit of Tostig Harold; it reaches the ear of John Thomas who,

for some reason, has power to investigate it; John Thomas has a settled aversion to Tostig Harold, and is not in the habit of giving him credit for good intentions; but, in the present case, he professes strict impartiality, and "talks big," as our American cousins say, about daily balancing *pros* and *cons*. Is it likely that his prejudice and aversion will keep out of the scale? Not a bit of it. Just as the land-loving, sea-hating father is trapped into a fallacy, so, if we may believe the evidence of everyday facts, does the strictly impartial John Thomas evade the question by ignoring the *pros* for Tostig Harold, and establishing a wrong conclusion supported on the *cons plus* aversion and prejudice. Such, unfortunately for the interests of truth, is the method of procedure adopted by a certain class of writers who, while professing to be above prejudice, are so far its victims that they give to facts the colour of their prepossessions, and only take cognizance of such arguments as lie along the narrow vista they see before them.

(b.) This appears to be the right place to point out the mistake—which hardly seems to be recognized by logicians as a fallacy—of supposing that the failure of an argument proves the opposite conclusion. Logically it cannot do so; for, as we saw in treating of propositions, though the falseness of one contrary may be inferred from the truth of the other, yet from the falseness of one the truth of the other may not always be inferred, because sometimes both contraries may be false. Practically, however, the failure of an argument may tend to, and indirectly strengthen the proof of the opposite

conclusion. In a court of justice, for instance, when the case for the defence breaks down, it cannot be inferred that the case for the plaintiff will necessarily be established, though this often takes place in fact.

(3.) Contrary to the **principle** or **ground of the argument,** are the fallacies of:

(a.) Begging the question . . M.
(b.) The vicious circle . . . M.
(c.) False generalization . . M.

(a.) **Petitio principii,** or **begging the question,** consists in taking for the ground of the argument, and so assuming as true, what requires to be proved. This may occur in different ways, though some logicians limit the extent of the *petitio principii* to its most usual form, which is to say the same thing twice over in different words, and then make one statement the proof of the other. Thus the thesis is made to do duty for the ground of the argument, and the former is proved by means of itself, *e.g.*, if I say that the soul is immortal because it lives for ever, or because it never dies, I am making a true statement twice over, but I am not proving the immortality of the soul. If I try to prove that the earth moves round the sun, and argue that because the sun is at rest (as regards the earth), the earth moves round the sun, I am begging the question: for, in saying that the earth moves round the sun, I imply that (with regard to the earth) the sun is at rest, and hence I take for the ground of my argument something contained in the thesis. Molière gives us a capital instance of this form of the fallacy in the physician Ignarelle, who tells the father of a

dumb girl that her infirmity is easy to explain, "she has lost the power of speech." "Yes, yes," presses the father, "but the cause, if you please, why she has lost the power of speech." "All our best authors will tell you," readily retorts Ignarelle, "that it is the impeding the action of the tongue." Again, why can I see through glass? Because it is transparent. Why can I break glass? Because it is brittle. Why cannot Ernest see? Because he is blind:—are all cases in which I beg the question, and prove nothing, because my proofs are no proofs whatever, since the thesis is repeated in different words.

Another way of begging the question is to use a word signifying disapproval, *e.g.*, unfair; and then say because some act or other was unfair, it should not have been done. For instance, James got his marks unfairly; no one should get marks unfairly; therefore James should not have got his marks. The argument looks quite right; but it should first of all have been proved that the marks were got unfairly in the accepted use of the term; instead of which this is taken for granted. Personal or corporate infallibility, too, is taken for granted in arguments based on such phrases as, "I have never heard of such a thing," "*we* have never taught that," "it is not according to *my* ideas," "it does not please *my* eye." Some examples: When Buckingham, urging that the young Duke of York ought not to have the right of sanctuary at Westminster, argues

> Oft have I heard of sanctuary men,
> But sanctuary children ne'er till now,

he is basing his argument on the suppressed premiss,

"whatever I have never heard of cannot possibly be right"—an assumption which any man living has a right to call in question. And, when old world teachers demur to accept the results of modern investigation and discovery, on the mere plea that "we have never taught that," the ground of their argument is the lucid if not luminous statement, "whatever we have never taught cannot possibly be right"—a very patent absurdity. "Is this book suited for young people?" "Certainly not; it is not according to my ideas." "A proof *that*, which requires to be proved," any sensible man would mentally ejaculate. A group of young people are "doing the critical" in the National Gallery; they stop before a picture. "Something wrong in that drapery," remarks one. "Quite sure of it," puts in another, "it does not please my eye." "Humph," thinks a more logical passer-by, "what displeases that young person's eye cannot possibly be right. Surely this basis of argument calls for proof." Many of these examples might be adduced equally well as instances of the fallacy *non causa pro causa;* but this fact does not make them severally any the less a *petitio principii*, for in each the ground of the argument is a gratuitous assumption demanding proof. The same may be said of the widely accredited piece of fallacious reasoning, that "as the non-existence of space cannot by any mental effort be *imagined*, therefore the non-existence of space is absolutely *inconceivable*." Without striking into deeper strata than we are examining in these simple Logic lessons, we shall, if we examine this specious argument carefully, find a place for it in several classes

of fallacies. Confining our attention, however, to its basis or ground, we see that it rests on the suppressed premiss that, *what we cannot imagine we cannot conceive*, a statement in which there is a palpable error of confusion, material imagination being confused with immaterial thought, and practically identified with it. Until they are proved to be identical, I accept no conclusion based on their identification.

(b.) The **vicious circle.** This fallacy consists in proving one thing by means of another, and that other by the first of the two things thus presumably proved, *i.e.*, the thesis by the ground of demonstration, and this last by the thesis. For instance, to prove the existence of God from the existence of the world, and then to prove the existence of the world from the existence of God, would be to argue in a circle. The longer the chain of reasoning in which this is done, the more likely is the fallacy to escape detection. To take other examples: if I try to prove a boy's diligence during Term by his success at the examination, and then prove his success under examination fire by his diligence during Term, I am very palpably arguing in a circle. Under a cloud of words to conceal the device, this was the method of reasoning used not long ago about a controverted will, which was declared genuine because it bore the signatures of witnesses and testator, while the genuineness of their signatures was next deduced from the genuineness of the will itself. These two instances will serve to show, however, that the fallacy in question takes place when we are arguing with one person, or rather with one partisan or

opponent (these may sometimes be a collective body); for it is obvious that, in arguing separately with many persons, it is quite legitimate to make the thesis of our argument with one, the ground of our argument with another, for then the two arguments are quite distinct; *e.g.*, it may be allowed that a boy has been diligent during Term, but denied that his examination was a success; while someone else may consider his examination brilliant, but call in question the Term's diligence. Now, if I have reason to believe that he was both diligent and successful, there can be no possible objection to my naming his diligence as a proof of his success to one person, and his success as a proof of his diligence to somebody else; and no one can charge me with arguing in a circle. And a man believing in the genuineness of the controverted will, was quite justified in bringing forward the signatures as a proof of its genuineness to one party, and to another its intrinsic genuineness as a proof of the genuineness of the signatures. If a negress, recently freed from slavery, came to me believing neither in freedom nor in responsibility; and if, in the attempt to rectify her ideas, I proved responsibility from freedom, and then proved freedom from responsibility, I should certainly be arguing in a circle, and possibly leave her ideas as much confused as would be my own reasoning powers. We will suppose that the good woman's husband comes in search of her. To meet the requirements of our example, he must be my next disciple. I find he has a very decided belief in freedom, but is innocent of any faith in responsibility; so I indoctrinate him on the matter, basing

my argument on freedom. Before the week is ended, I go into the hospital and find there a poor Indian woman converted to Calvinism some years ago. That there is such a thing as freedom, she will not admit; but her sense of responsibility is helping to kill her. If, for her comfort, I sit down by her side, and bit by bit prove freedom to her very simply, basing my argument on responsibility, no one will dream of saying that I am arguing in a circle, because, only a few days before, I had made freedom the basis of my argument for responsibility with the negro.

In purely objective scientific arguments, however, we must always suppose that we are arguing only with one person, and so must never under any circumstances make use of an argument of which we have the conclusion in one of the premisses, *i.e.*, argue in a circle.

(c.) **False generalization,** or **invalid induction** consists in making the ground of the argument a proposition which seems to be universal, but is not so really, and then arguing from the simulated universal to particulars. Instance the celebrated sophism: Epaminondas said, All Cretans are liars; but Epaminondas was himself a Cretan; hence he lied; hence the Cretans are not liars; but Epaminondas was a Cretan; hence he did not lie; hence the Cretans are liars; and so on *in infinitum*.

Under the head of false generalization fall naturally all violations of the rules for the validity of induction, which we shall speak of just now, even though they may not be directly contrary to the rules for the ground of demonstration, and though

they may also belong at the same time to some other class of fallacies than that of invalid induction. Thus we sometimes argue that what is true of many things considered universally, is also true of something which does not come under the rule; in other words, we give to a mere moral universality the scope of an absolute universality; *e.g.*, we know that the French as a nation hate the Germans; but we have no right to infer that all the French in London hate all the Germans in London, or that all the French boys in a cosmopolitan college hate all the German boys. In the same way, because Presbyterians as a body exclude enjoyment from their Sunday programme, we cannot infer that this will necessarily be the case in every Presbyterian family. In these instances the fault lies in extending the generalization too far.

Sometimes also, we argue that what is true only of some things in a class, is true also of all things in that class as such. This we have already considered as the *fallacia accidentis*, in which we err by arguing from a particular case to a general rule, as did a maiden lady of an uncertain age, who, on hearing of the dynamite attempt upon the Tower and Houses of Parliament, declared that public buildings *en masse* had been proved dangerous, and therefore she would never again enter one, "no, not even a church."

Again, we sometimes argue from a particular case to another particular case, which has only an apparent and not any real connection with the first. This is sometimes called the fallacy of *a non tali pro tali*, and is only a kind of fallacy of false analogy (q.v.); *e.g.*, it would be simply absurd to argue that,

because I may kill a man in self-defence, I am at liberty to kill Carey for abandoning the Prince Imperial in danger, for there is no parallel whatever between the two cases. And for the same reason, when Gordon was holding Khartoum, I had no ground for concluding that, because the French had the worst of it at Sedan and Metz, General Gordon would have the worst of it at Khartoum; though this need not have prevented me from thinking upon quite other grounds that his chances of success were never higher than a minimum. Sophisms, which under one aspect may be classed as fallacies of ambiguity, may from another point of view have a still better claim to be regarded as instances of the form of false generalization with which we are at present engaged. In proof of this, some of the examples given of the fallacy of ambiguity may be re-examined. Passing to a fresh one, we find a little fellow innocently juggling with the word *light*, and reasoning from special cases to other special cases, between which there is not the connection assigned as the ground of the argument. He may say, for instance, "Fire and gas and lamps are light, and they do burn my fingers; how the little boys and girls in the transformation scene of the pantomime must be burning; how the big light moon would burn my finger, if I could put it in."

In concluding this outline of the sophisms, it may hardly be necessary to note that, when we have detected one flaw in a specious piece of reasoning, it does not follow that we have discovered all its weak places; for, as has been shown, a single false argument may contain more than one fallacy,

and a single fallacy may belong at once to more than one class: hence the saying "a fallacy is a nest of fallacies"; and hence too the parts of the division of fallacies cannot mutually exclude each other.

CHAPTER XI.

XXV. Kinds of demonstrative arguments.

XXV. Kinds of Demonstration or Demonstrative Arguments.

According to the point of view from which they are regarded, Demonstrative Arguments may be:

(1.) a priori, or a posteriori;
(2.) direct, or indirect;
(3.) objective, or subjective;
(4.) progressive, or regressive;
(5.) main, or subordinate;
(6.) deductive, or inductive.

(1.) A priori or a posteriori.

(a.) An **a priori** argument is one in which the proposition, that is the ground of demonstration, is also either the objective reason, or the cause of the thing we are proving: hence, in an argument *a priori*, we reason either from the reason to the result, or from the cause to its effects, or from the essence of a thing to its properties; *e.g.*, we can prove responsibility from free-will, which is its reason, inasmuch as responsibility results from free-will; we can prove the existence of the natural order of the world from the infinite goodness and wisdom

of God, as effect from cause; and we can prove the immortality of the soul from its spirituality, thus deducing a property from the essence.

(b.) An **a posteriori** argument is one in which the ground of demonstration is the objective result or effect of the thing proved: hence we argue from the result to the reason, or from the effect to its cause, or from the properties of an object to its nature; *e.g.*, we argue *a posteriori* when we prove free-will from responsibility, because we argue from the result to its reason; in proving the existence of an all-wise and beneficent Creator from the existence of the natural order in the world around us, we argue from the effect to its cause; and, in proving the spirituality of the soul from its power of thought, we reason from a property to the essence.

Thus, in demonstrating anything *a priori*, we proceed from what is prior to what is posterior in the order of *things*, quite independently of our knowledge; while in demonstration *a posteriori*, on the contrary, we begin with the matter of our previous knowledge, *i.e.*, with what is posterior in the order of *things*, and lead back to what is prior. Mathematical proofs, for instance, are of the *a priori* kind; whereas the conclusions of experimental science are gained *a posteriori*. Why the latter method should be queen-regnant in the domain of historical criticism, and why the *a priori* argument nevertheless holds a corrective office there, we cannot learn better than from the great Belgian Bollandist, Father de Smedt, S.J.[1]

[1] *Principes de la Critique Historique*, chaps. ii. and xvii.; and *Introductio Generalis ad Historiam Ecclesiasticam critice tractandam*, tract. i.

(2.) **Direct or Indirect.**

(a.) **Direct** arguments are those in which the truth of a thesis is proved in such a way as to show that the thesis is already granted implicitly, or rather potentially, in granting the ground of the argument, and so must be true in consequence of that ground being true. Hence, the middle term of the syllogism must be some *undisputed* truth, which either agrees or disagrees with the extremes of the proposition; *e.g.*, if in proving the incorruptibility of the human soul, I take for the ground of proof the proposition, "the soul thinks," and from thought deduce the immateriality of the soul, from this its simplicity, from its simplicity its indissolubility, and therefrom its incorruptibility, my argument would be a direct one. And so too is the following: Immutable Being is eternal; God is immutable Being; therefore God is eternal.

(b.) **Indirect** arguments are those in which the truth of a thesis is proved by demonstrating the falseness of its contradictory. To demonstrate the falseness of this contradictory, we should show the false or absurd consequences that inevitably result from it; and from these consequences deduce the falseness of the source from which they flow, according to the axiom: What is false results only from what is false. Under this aspect, that is to say, inasmuch as the contradictory of the thesis is carried on to its false and absurd consequences, the indirect argument is called an **argumentum vel reductio ad absurdum**; *e.g.*, if I were to say, in proving man's free-will: If man were not free, he would not be responsible, for he would be incapable

of responsibility; if incapable of responsibility, he would be incapable of merit, of sin, of reward, and of punishment; but all this we know to be false and absurd; hence man cannot be not free, *i.e.*, he must be free,—my argument would be obviously a *reductio ad absurdum*. Again, in proving the moon to be an opaque body, we argue indirectly when we say, we know that the moon's interposition between the sun and the earth occasions an eclipse of the sun; but, if the moon were a transparent body, her interposition would not obscure the sun's light; hence she cannot be transparent; hence she must be opaque. The indirect mode of argument is often used in mathematical demonstration, *e.g.*, one line is proved to be equal to another, by proving that it cannot be greater, and that it cannot be less; it must be either greater, or less, or equal; so, when we have shown that it is neither greater nor less, we have indirectly proved that it must be equal.

Thus, we see that a direct, or—to give it its technical names—an apodeictic or ostensive argument, goes straight from the ground of demonstration to the thesis; while an indirect or apagogic argument, on the contrary, goes in what may be called a roundabout way, by first of all proving from the ground of demonstration the falseness of the contradictory of the thesis, and not till then proving the truth of the thesis. The scientific value of the direct argument is clearly greater than that of the indirect, because the direct shows how and in what degree the thesis must necessarily be true, and indirect arguments do not do this. Their force, however, is in no way less than that of the more satis-

factory and scientific direct arguments; and their use is a necessity when, from the nature of the case, apodictic demonstration is impossible. To demonstrate directly the falseness of perfect scepticism, for instance, is an impossibility, because there is no foundation for an argument, that is not pre-occupied by doubt. Under its interdict lie the infallibility of the reasoning faculty and of the understanding, as well as the formal laws of thought. But we can expose its intrinsic absurdity thus: either the sceptic doubts the truth of his scepticism, or he does not. If he does doubt, the categorical enunciation of his doubt is absurd. If he does not doubt, he gives the lie to his own system, seeing that there is something about which he does not doubt, viz., his philosophy of doubt.

(3.) **Objective or Subjective.**

(a.) An **objective** argument (**argumentum ad veritatem**) proceeds from a general principle of demonstration, and therefrom proves the thesis, without taking into account our partisan or opponent's frame of mind, or the manner of regarding the matter, which he has made his point of view.

(b.) A **subjective** argument (**argumentum ad hominem**), on the contrary, is one in which we place ourselves at the point of view occupied by the person for or against whom we are arguing, and argue from some principle which he recognizes or accepts as true, that is from his "professed principles." This may be done in two ways, viz., either by putting ourselves on a level with the persons with whom we are arguing, and proving our thesis from such principles as we know they cannot fail

to understand; or by arguing *ex concessis*, that is by taking as a principle of demonstration something already granted or conceded as true by our adversary, and from it either proving to him the truth of a proposition, or disproving his false thesis. In this last case the argument is called Retorsion; we had an example of it in showing how a dilemma can be turned against ourselves.

Objective arguments are sometimes called **absolute,** because the general principles from which they proceed are certain, and should be universally admitted: while subjective arguments are called **relative,** because their principles, if not universally admitted, must at least be held to be true by those with whom we argue, whether these principles be in themselves true or not. In seeking truth for its own sake, and hence in purely scientific matters, we must obviously make use of objective or absolute arguments; but, in demonstrating or pressing a point home to individuals, and perhaps still more to masses of men, it is equally clear that a subjective or relative argument will serve our purpose better; and it is perhaps so true of nothing as of these two classes of arguments, that "what is best in itself is not always the most expedient." As instances of each kind, we may contrast a judge's "summing up" of a trial with the speeches made by parliamentary candidates when canvassing for votes before an election. The judge's summary of evidence is an evident case of an argument *ad veritatem*, and so, according to *Blackstone*, should be the preceding speeches made by the counsel for plaintiff and defendant respectively.

This accounts for the value attached to "precedent" in legal decisions, which have to do with an objective standard of right and wrong explained and elucidated, though not primarily determined by "law," and so which are not swayed by subjective or personal arguments. The speech of a parliamentary candidate, on the other hand, must be very largely an *argumentum ad hominem*, if it is to attain its end, and help the speaker to a seat at Westminster. In insisting upon a point, it might be in itself the best, but it might be far from the most expedient to argue from a general fact or principle as such, for probably half his hearers would be unable to follow him; but, if the same point were put before them as the outcome of their professed principles, or as being necessary to the consistency of their avowed line of conduct, the candidate's chance of success would be far greater, in so far as it depended upon argument, which—as a matter of fact—is by no means the largest factor in working the sum of popular votes. Some of the best examples of an *argumentum ad hominem* may be found in St. Paul's Epistles, *e.g.*, to those who admitted Christ's teaching, but denied that we shall rise again from the dead, he says that, if it is true that we shall not rise again, Christ did not rise again; if He did not rise again, His preaching is vain; and if his preaching is vain, our faith also is vain; but it is admitted that He rose again, that His preaching is not vain, and that our faith is not vain: hence, *ex concessis*, it must be admitted that we shall rise again from the dead. The familiar story of the young rhetorician

and his master well exemplifies the *argumentum ad hominem* in the form of retorsion. An old sophist undertook to instruct a young rhetorician in pleading, on the understanding that he should be paid when his pupil gained his first cause. The master sued for the reward, whereupon the scholar sought to evade the claim by a dilemma. "If I gain my cause, I shall withhold your pay, because the award of the judge will be against you; if I lose it, I may withhold it, because I shall not yet have gained a cause." Whereupon the master retorted: "If you gain your cause, you must pay me, because you are to pay me when you gain a cause; if you lose it, you must pay me, because the judge will award it."

(4.) **Progressive or Regressive.**

(a.) **Progressive** arguments or, as they are sometimes called, **synthetic,** are those in which we start from the ultimate principle or ground of demonstration, and from it descend through a series of syllogisms to the thesis, *e.g.*, I meet with a man who, from professing general "know-nothingness," has come to question the very palpable evidence of sense that he is a *substance,* yet, with strange inconsistency, concedes, the substantiality of living beings in general and as such. Quite enough that for my purpose:

Living being is substance;
But an animal is a living being;
Therefore an animal is a substance.
But man is an animal;
Therefore man is a substance.
But you, Malcolm Mactab, are a man;

Therefore you, Malcom Mactab, are a substance.

(b.) In **Regressive,** or **Analytic** arguments, we go through the precisely reverse process, *i.e.*, we prove the thesis by the principle of demonstration from which it immediately proceeds; then prove this by the one next above it; and so on through the series till we reach the ultimate principle or ground of demonstration; *e.g.*, Malcolm Mactab's nephew, Duncan Dewdrop, shares his uncle's difficulty about self-substantiality, but concedes only that he was Duncan Dewdrop yesterday, is Duncan Dewdrop to-day, and was Duncan Dewdrop grinding at Latin gerunds ten years ago. Yet Duncan Dewdrop, you *are* a substance, because

Duncan Dewdrop is a man;

But man is an animal;

Therefore Duncan Dewdrop is an animal.

But an animal is a living being;

Therefore Duncan Dewdrop is a living being;

But living being is substance;

Therefore Duncan Dewdrop is substance. Other examples of this way of arguing have already been given in treating of the polysyllogism (q.v.).

(5.) **Main or subordinate.**

(a.) A **main** argument is that one which has the greatest force with reference to the thesis, inasmuch as it really proves it; *e.g.*, a notorious burglar charged with breaking into a house at Hammersmith, is discharged without much examination mainly because he can prove an *alibi*, and show that, at the time of the robbery, he was actually finishing a term of imprisonment at Cardiff.

(b.) **Subordinate** arguments are such as serve, by

their connection with the main argument, to elucidate the thesis still further by showing its truth when regarded from other points of view. Of themselves they would not be sufficient to establish its truth in the given case; but in dependence on the main argument they are most useful in making this truth clear when regarded in various aspects. Examples of subordinate arguments will often be found among the proofs for the **necessity** of anything, *e.g.*, of law, of which the need becomes more and more apparent according to the number of aspects under which it is regarded.

(6.) **Deductive or Inductive.** Before distinguishing the kinds of demonstration known as Deduction and Induction, it may be well to make the preliminary observation that the popular meaning of these two words in English seems to be an exceedingly vague one, which, like all other vague meanings, is apt to be misleading. All reasoning of the kind we have been considering, is marked off in an indefinite sort of way as deductive or syllogistic, because we deduce or lead down the truth from premisses to a conclusion; while induction is held to be the process of collecting and investigating facts, forming hypotheses, and then deducing inferences from the hypotheses, to which the facts when ascertained have given birth. On the face of it there are at least two big blunders to start with in any such explanation as this. In the first place, the definition of formal logic must have made it clear that, as far as induction is taken to mean a process of inquiry, it is altogether outside the province of formal logic, the office of

which is, not to *get* premisses, but to see if any, and what conclusions can be drawn from them when got, no matter how. In the second place, when we deduce inferences from the hypotheses which are the result of our fact-gathering, what are we doing but going through a process of deductive reasoning capable, like every other such process, of being thrown into syllogistic form? Hence, the rules for Division, which we have already studied, will tell us that, in the popular acceptation of the terms, Induction includes Deduction, and so that the distinction must be inadequate, and consequently that the Division is faulty. How Induction—as a process of reasoning—is reducible to the syllogistic form, and is in fact nothing else but a syllogism, we shall see just now. So far it is clear that, though Deduction and Induction have each a distinct meaning of their own, it is not that which passes current in ordinary parlance. Equally untenable too is the view which identifies Deduction with Demonstration, and considers Induction as an essentially distinct form of reasoning, having nothing whatever in common with Demonstration. So far is it from being essentially distinct from Demonstration, that it is nothing whatever but one of its many forms, standing to it in the relation of species to genus; for the simple reason that, as Demonstration or Demonstrative arguments are, in contradistinction to probable arguments, those in which the thesis is *shown* to be certain, or is "proved to demonstration," and as this is likewise done by Inductive reasoning, Induction must be comprised among

the various kinds of Demonstration. Hence too, Deduction cannot be identified with Demonstration, or it could not be contrasted with Induction which is a form of Demonstration; for it would be a very incorrect division indeed—in fact no division at all—that would seek to contrast a whole with one of its parts. Supposing, for instance, we tried to divide fan-tail into fan-tail and fan; or lion into lion and mane; or "honourable stops," as a writer in *Merry England* has called them, into stops and colons.

(a.) In its wide meaning **Deduction** may be taken as identical with every argument *a priori* (q.v.); but strictly speaking, as the correlative of Induction, it is a particular form of the *a priori* argument, one in which we draw out a particular from a general truth, on the assumption that what is true of the whole must be true of each part. Its most general formula is that, **what is or is not predicated of the universal, is or is not predicated of the particular.** Thus we reason deductively from the genus to the species, and from the species to the individual, *e.g.*

Every animal has five senses;
But the horse is an animal;
Hence the horse has five senses.
Every horse is a quadruped;
But Bucephalus was a horse;
Therefore Bucephalus was a quadruped.

In these two examples the *a priori* element in deduction is readily discernible; for the horse has five senses *because* it is an animal; and, if Bucephalus had not been a quadruped, he would not have been a horse.

(b.) **Induction**, in its wide meaning, is a simple

synonym for every argument *a posteriori;* but, taken in its exact signification, it is that form of the *a posteriori* argument, in which we reason from the parts to the whole, or from the particular to the general or universal, *i.e.*, from individuals to the species, or from like facts or phenomena to a general law, according to the formula that, **what is or is not predicated of every particular, is or is not predicated of the universal.** Herein the *a posteriori* element at once reveals itself; for, when we argue from the particular to the general, we have *eo ipso* an argument from result to reason, or from effect to cause, seeing that particulars stand to the universal, under which they are comprehended, in the relation of result to reason, or of effect to cause. For instance, when we find that all birds we know of have warm red blood, and infer that warm red blood is an essential property of all birds, we argue from result to reason; and when, from seeing that bodies are always expanded by heat, we conclude that the expansion of bodies by heat is a universal physical law, we argue from the effect to its cause. In both our examples, we have gone through the process of inferring that a proposition is true universally from finding it to be true in a number of particular instances; but in neither case is our conclusion based on an enumeration of *all* the particular instances that might be adduced. Hence our induction is an incomplete one. Indeed there are very few cases in which induction can be complete, *i.e.*, in which all the individuals comprised in a species, or all the cases in which the effects of some particular law of nature are observable, can be enumerated. Besides

being practically impossible, such an enumeration would be simply useless, for then we should be arguing not from the particular to the general, but from all individuals to all individuals again, from the known to the known, not from the known to the unknown; *e.g.*, we should be wasting words to no purpose if, to someone who knew that the family of Sennacherib Scatterbrain consisted of three sons, we said—Peter, James and John Scatterbrain are all in London; therefore all the sons of Sennacherib are in London. So it comes to this, that our enumeration, though not exhaustive, must be sufficiently full to warrant our drawing the conclusion that, what is true of the individuals or of the particular cases, is true also of the species or of the general law; and to do this rightly we must act upon the axioms that form the very basis of Induction, viz., that **like principles have like results,**—and **like (physical) causes like effects.** Only by proceeding from these principles can we form a true inductive argument. The reason is a simple one. When, from observing that a certain property belongs to all the individuals of a species, that fall within the limits of our personal experience, we conclude that the property in question is to be found in all other individuals of the species, we do so because we attribute the property to the specific nature of the individuals, as to its principle, on the ground that the same specific nature as the principle of these properties and qualities, must be accompanied by them as its results. Similarly, in leading back from effect to cause, and arguing from the constant uniform recurrence of certain phenomena

observed by us, that in all other cases unknown to us they actually exist, we attribute the phenomena to the specific nature of their common cause, on the ground that like physical causes, in so far as their action is unimpeded, must always produce like effects. No explanation is needed to show that the two principles we have been considering are first principles; hence they must be both universal and necessary, and moreover be in themselves sure and certain. From this therefore we **conclude:**

(*α*) that the truths or conclusions arrived at by means of Induction are universal and necessary, because they result from the application of general and necessary principles to what is particular and contingent; for instance, our two examples about the warm red blood of birds, and the expansion of bodies by heat, are undoubtedly universal and necessary, *i.e.*, there is no exception to the rule, and every individual case proves its necessity.

(*β.*) Yet, in the case of a general law of nature, the universality and necessity ascertained by means of Induction only are conditional; for it may happen that the action of some other law of nature may under certain circumstances interrupt the action of an otherwise uniform law, or that this last may be sometimes suspended by the interposition of God's power; *e.g.*, it may be that, under some exceptional circumstances, heat will not expand a body in consequence of the counter-action of some other physical law. And, although it is quite true that the law we have gained from induction—"every body which is specifically heavier than water sinks in water"—is in itself both necessary and universal; yet, by the

miraculous intervention of God's power, there have been exceptions to this law, as, *e.g.*, when our Lord Himself and some of His saints during the last eighteen centuries walked upon the waters.

(γ.) Lastly, an Inductive argument, being grounded on principles that are sure and certain, is in itself, or essentially, a perfect demonstrative argument. Where there is question of a universal law of nature, the conclusion gained by induction from the given principle is only hypothetically certain; but under the specified conditions it is certain, and remains so as long as these conditions last; and this is quite enough. No one can reasonably doubt, for instance, that heat expands bodies, and that bodies specifically heavier than water sink in water, unless the action of some other law, or the direct interference of Divine Power cancels the conditions on which the uniformity of such laws depends.

To make our inductions valid, however, we must observe the following **rules**:

(α.) In reasoning from the individuals to the species, it is not sufficient to argue from a few instances; we must extend our inquiry so far at least as to make it embrace really representative members; otherwise we shall not have a sufficient basis for our argument.

(β.) Then we must be careful not to mistake merely accidental qualities for those that are essential, and so fall into a *fallacia accidentis*, which has been already explained.

(γ.) In reasoning from phenomena to a general law, our observation of the phenomena should be as wide as possible, and be followed by repeated and

various experiments. Observation and experiment are not in themselves Induction any more than they are Logic; but they are the necessary means by which certain premisses may be obtained for inductive reasoning.

(δ.) It is further necessary to ascertain whether the phenomena observed are uniform and unvarying effects of the action of the physical cause assigned to them. If exceptions to the rule occur, an inquirer should then get to know whether they are to be explained by other causes, and whether these causes modify or even nullify the law he is seeking to deduce from the phenomena. Exceptions, for which an obvious explanation can be given, do not weaken an inductive argument; but, when there is no satisfactory way of accounting for them, they of course render valueless the premisses against which they militate, and which consequently cannot form a certain basis from which a universal law may be inferred. Hence Logic forbids our using them in any argument that we put forward as demonstrative.

Now, if Logic has a right to do this, it is again evident that Induction must fall under its laws; and, if it falls under the laws of Logic, **Induction** must either implicitly or explicitly be **in logical form**; and the form of Logic we have shown to be the syllogism; hence Induction must itself be a syllogism either openly or in disguise.

(*a.*) To take, first of all, an example of perfect or complete induction. If I say: Mercury, Venus, the Earth, Mars, &c. (naming all the planets) receive light from the sun; therefore all planets receive light from the sun,—I am plainly enough using the

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incomplete syllogism called an euthymeme, in which one premiss is suppressed, though understood; so that my argument can be thrown into regular syllogistic form thus:

Mercury, Venus, the Earth, &c. (naming the rest) receive light from the sun;

But all planets are Mercury, Venus, &c. (naming the rest);

Therefore all planets receive light from the sun.

This is a very good instance for illustrating the uselessness of complete induction; for, if I say that each planet individually gets light from the sun, I am only saying the same thing in different words when I state in the conclusion that all planets do so.

(β.) In Incomplete Induction, too, we are really reasoning from a suppressed premiss, viz., either from the proposition, that because certain quality is found in all the observed individuals of a species, it belongs to the species as such, *i.e.*, to the specific nature of the individuals; or from the kindred proposition, that because a certain phenomenon is always seen to result from the action of some physical cause, it must have its origin in the specific nature of that cause. What right we have to make use of these premisses, we shall see by recalling the explanation of the application to induction of the principles on which it rests; and that explanation will show us further that an induction is essentially dependent upon a middle term, and that, although we speak of reasoning from particulars to the universal, we are in point of fact reasoning from what is universal in those particulars back to its

reason or cause, as the case may be. Thus our argument, that because all the birds we know of have warm red blood, warm red blood is an essential property of all birds, implies the first of the proposed propositions as one of its premisses, implies consequently a middle term, implies moreover an argument from what is universal in the instances adduced to the reason from which it results, *e.g.:*

Because the quality of having warm red blood belongs to all known birds, it must be part of their specific nature;

But unknown birds have the same specific nature as known birds;

Therefore (according to the axiom, like reasons have like results), the quality of having warm red blood must belong to the unknown as well as to the known birds, *i.e.*, be a universal and essential property of the species.

Against the validity of incomplete Induction as a form of syllogising, it may be urged that it violates one of the most important rules to be observed in reasoning, viz., that the conclusion should not have greater extension than the premisses, *i.e.*, contain anything that is not in them. Now the species has greater extension than the individuals from which the specific quality is inferred, or—to speak more accurately—the specific quality considered either actually or potentially *per se* has greater extension than the instances of it known even to the widest experience; and the whole has greater extension than its parts; and the cause, as container, has greater extension than its effects, which are to it as things contained. How is the difficulty to be met?

Some logicians thought to manage it by adding to their enumeration, "and so of the rest," or "and so of every other," *e.g.*, This body is heavy; so is that one; and so is every other body; But this, and that, and every other body are all bodies; therefore all bodies are heavy. At best such a method is very unsatisfactory; for it strives to make the induction complete by means of a mere assumption, and then makes the conclusion nothing but an amended repetition of a very clumsy first premiss. But, if we choose one of the two propositions proposed at p. 131, to do duty for our missing premiss, we shall have in that premiss either the specific nature of the individuals, or the specific nature of the cause which produces certain effects, according to the requirements of our argument; and so shall not lay ourselves open to the objection that our conclusion has greater extension than our premisses. So much for the form of Induction, to which the definition of the syllogism[1] will be found to apply as strictly as to Deduction.

A word remains to be said of the **value and scope of Induction.**

Its scientific value is nothing less than enormous; for by it we come to know the essential characteristics of the species or classes to which observation extends; and by it, and by it alone, inasmuch as we arrive at the knowledge of universal laws by the conclusions drawn from the uniform recurrence of phenomena, can we discover the laws of physical nature. In the first case, it is one means of gaining correct ideas and giving correct definitions; in the

[1] See p. 32.

second case, it is the only means and the necessary means of establishing and pursuing and perfecting natural science. Witness the history—if we may so term it—of the discovery, the testing, and ultimate verification of the law of gravity.

The reasoning we are all of us, more or less unconsciously, going through during the day is, for the most part, nothing but induction and analogy and hypothesis, resulting from observation. A child reasons inductively when, from seeing snowdrops in many gardens every January since his powers of observation began to develope, he argues that it is a property of all snowdrops to flower early in the year. But statements which are the outcome of merely enumerative induction are usually temporary and liable to correction, for the obvious reason that they do not—according to the laws of valid induction—lead back to the cause or principle *viâ* the specific nature of the individuals enumerated. Hence, in our every-day reasoning, the proportion of the *bonâ fide* inductive element is small compared to that of hypothesis and analogy.

That Induction cannot be used to demonstrate matters of faith, we shall see later on; but it was yet to be noted here that it can have no application whatever to facts of the moral order, because any unvarying uniformity in such acts is impossible, for the reason that they are dependent not on a necessary, but on free rational causes; hence a universal law cannot be inferred from them. From any uniformity that is observable in facts of the moral order, we can only conclude—at the very most—that under certain circumstances or con-

ditions, people will usually act in one way, and not in any other. But from this we cannot further conclude with any kind of certainty, that some particular person will, under precisely these circumstances or conditions, act in the one way which we know to be usual; still less have we any right to conclude that he ought to do so.

Having now got some notion of the Demonstrative Argument, we must next take a little look at the Probable Argument, *i.e.*, an argument of which we prove the conclusion by some probable medium; for we often find that an argument adduced in support of a thesis has not the force of certainty but only of probability.

CHAPTER XII.

XXVI. Probable arguments.

XXVI. Probable Arguments are of three kinds, viz., of

(1) Analogy;
(2) Congruity;
(3) Hypothesis.

(1.) **Analogy.** In reasoning by analogy, we conclude that two or more objects, which either resemble or are unlike each other in several or many qualities, will probably resemble each other or else be unlike in some other qualities; and, applying this to causes, we infer that because two or more causes have many qualities in common, they will likewise have effects in common; and conversely that, if their

qualities as causes are unlike, they will also differ in their effects. When, for instance, we conclude from the flattening of the earth at the poles, that our globe must originally have been a soft mass, we are reasoning analogically, because our argument is based on the analogy between our earth and any ball revolving on its own axis; the likeness between the two consisting in globular form and revolution round axis. Now, as such a ball revolving round its axis is not flattened at its poles unless it be soft, we infer that the earth must have been originally soft, for otherwise it would not be flattened at the poles. This example can be put into an experiment of twisting a ball of soft clay or dough rapidly round a cane, and then doing the same with a ball of worsted, or the hardest ball through which we can force the cane. Again, we are using an argument by analogy when we infer the attraction exercised by the sun upon the planets, from the influence of the earth upon the moon, or from the attraction exercised by the earth upon all bodies that come within its influence.

All such arguments are based on the axioms: "Similars agree with similars; dissimilars with dissimilars;" and, "Similar causes produce similar effects; dissimilar causes, dissimilar effects." Yet these axioms are not of universal application, nor are they verified in every case; hence they cannot form the basis of perfectly demonstrative arguments, but only of such as make the thesis for proof more or less probable. The greater, however, the similarity between the things compared, the higher is the degree of probability established, so that now

and then conclusions resting on analogy may even appear to amount to certainty. But as, generally speaking, this kind of argument produces nothing beyond probability, there is always something uncertain and unsatisfactory in endeavouring to establish a thesis solely by means of analogy. At least, in such a case, no sort of unconditional certainty can be claimed for the conclusion, though—as a matter of fact—this is too often done. To strengthen, or rather to tell out and give circumstantial cogency to a demonstrative argument, analogy may be very useful; but, in a general way, it has itself but little force; and is more effectually used to silence objections than to prove or discover truth. In the use of analogy, care must first of all be taken to ascertain that the similarity or dissimilarity between the things compared or contrasted, is a real, and not merely an apparent one; and during the argument the analogy must not be extended further than the actual relation between the things warrants.

Argument by analogy may be threefold, viz.:

(a.) **A pari,** when the relation between the things is one of simple similarity; *e.g.*, Fortitude is commendable; therefore, *a pari*, is temperance commendable. When the sun shines brightest, sensible vision is not the most distinct; therefore, *a pari*, in the sunshine of prosperity our intellectual vision is not the most piercing. And the parent used an argument *a pari* when, in consoling his children for their disappointment on hearing that it was impossible for the robins to have given a leafy covering to the *Children in the wood*, he told them that, as

somebody[1] describes himself, when he was a child fallen asleep in a desert wood, covered with leaves by the wood-pigeons that took pity on him, so might the dead brother and sister have been cared for by the pitying robins. And, as Cassandra in the streets of Troy was obliged to prophesy, although she knew no one would believe her, so *a pari* are preachers or writers sometimes obliged to address auditors or readers who, they know, will neither heed them nor believe.

(b.) **A fortiori,** when there is not merely similarity between the things compared, but when the points of similarity belong in a much higher degree to the thing we are arguing about than to that or those with which it is in analogy; *e.g.*, arguing from the greater to the less—an angel cannot create anything; therefore *a fortiori* man cannot do so: and, from the less to the greater—detraction is evil; therefore, *a fortiori*, calumny is evil. When, in his *Analogy of Religion*, chapter 5, Bishop Butler compares analogically the present life, as forming the proper preparation for another, to childhood as a preparation for manhood, he naturally draws out his argument *a fortiori*. Of the same nature was the argument suggested by the poet Coleridge in showing his weed-covered garden to Thelwall. It was the opinion of the latter that it would not be right to bias the mind of a child by instilling into it opinions before it should have arrived at an age to judge for itself. "I showed him my garden," said Coleridge, "and told him it was my botanical garden." "How so," he replied, "it is covered with weeds." "Oh!"

[1] Horace, *Od.* iii. 4.

rejoined the poet, "that is only because it has not yet come to its age of discretion and choice. The weeds, you see, have taken the liberty to grow, and I thought it unfair in me to prejudice the soil towards roses and strawberries."

(c.) **E contrario,** when the analogy is that of contrast or opposition; *e.g.*, virtue is praiseworthy; therefore, *e contrario,* vice is blameworthy. Energy of will is the life of the intellect; wherever it is, there is action and animation; therefore, *e contrario,* where it is not, all is listlessness, dulness, and desolation. Innocence gives ease and freedom to the mind; therefore, *e contrario,* guilt disquiets and fetters it. Generous appreciation of merit brightens the reputation upon which it breathes; jealous depreciation, *e contrario,* blasts and withers it.

(2.) **Congruity.** An argument from congruity is one which brings out with greater clearness the truth of a proposition (already proved in some other way), by showing how it agrees with or is *congruous* to other truths of which we have certain knowledge. This kind of argument cannot, under any circumstances, be used to prove the truth of a thesis in the first instance. It takes that for granted, for its office is only to show the consonance or harmony of the proposition with other truths, and thereby to bring *its* truth into bolder relief, and so make it clearer to the eye of reason. Hence, being insufficient to prove to demonstration a truth not yet established, arguments from congruity have *per se* only the value of probable arguments. Such, for instance, are all the arguments made use of to make the mysteries of Christianity acceptable

to reason, for they do not make the truth of the mystery certain to us to begin with. That has been done by Faith. They are only used to make the truth clearer to our minds. For the most part such arguments fall into some one of the classes of arguments from analogy.

(3.) **Hypothesis.** By hypothesis we understand some proposition, which we have gained neither from induction nor deduction, but have merely assumed, in order to explain by it certain phenomena, because we think they can be rightly deduced from it; or, more shortly, it is something not proved but assumed for the purpose of argument. But, because the basis of such an argument is merely conjectural, it has received the name of hypothesis, which is the Greek word for supposition.

Hence, it is evident that no hypothesis has any scientific value until it has been shown how and why the phenomena in question may be accounted for by it. But even then the hypothesis is only more or less probable; for it may happen that the same phenomena may be equally well accounted for by some counter hypothesis. When there are thus two hypotheses, one seemingly as good as the other, it is necessary to test them by some facts or things which will agree with one and not with the other, and thus increase the probabilities in favour of one of the two hypotheses. Such facts or things are called crucial instances, and the experiment in which they are thus applied is termed an *experimentum crucis*. Hence, to make any hypothesis certain, we must seek to place it on a further basis

of purely scientific principles. When its adequacy has been inductively tested by such principles, and it is found to offer the only satisfactory explanation of the phenomena, to the exclusion of every other hypothesis, we may come to regard it as certain, or as a law of nature. Such, for instance, are Newton's Law of Gravity, and the Copernican hypothesis of the movement of the earth round the sun. In the same category scientists would probably place the undulatory theory of light, the luminous ether which is the medium of its transmission, and the vibratory theory of sound, which were in the first instance brilliant conjectures, and have passed into the range of scientific facts only because they explain what, on any other hypothesis, known to us, is inexplicable. Their certainty, therefore, is at best only a sort of provisional certainty. The word *theory*, which has several various meanings, is in science applied to a well verified, though not necessarily perfectly verified hypothesis.

If any hypothesis is to be held sufficient for the basis of an argument, it should fulfil the following conditions:

(*α.*) it must not be intrinsically absurd or contradictory;

(*β.*) it must not be in contradiction with the established truths of experience, faith, or science;

(*γ.*) it must not seek to obviate the difficulties to which it gives rise, by means of fresh hypotheses;

(*δ.*) it must explain *all*, not merely *some* of the phenomena in question;

(*ε.*) lastly, it should only be adopted and applied,

when the cause or reason of the phenomena in question has not yet been, or perhaps cannot ever be ascertained by any scientific method.

CHAPTER XIII.

XXVII. Scientific knowledge. XXVIII. Object of scientific knowledge. XXIX. End of scientific knowledge.

XXVII. Science or Knowledge, or more exactly, **Scientific Knowledge,** "the result or outcome of demonstration," as it is called by St. Thomas[1] may be regarded either **subjectively** or **objectively.** In the first of these two aspects, *i.e.*, **subjectively,** it may mean either the cognitions we receive by means of the light of reason, and so be placed in contradistinction to the teachings of experience and faith; or it may signify only our cognition of the truth of a proposition by means of *mediate* reasoning; and, as the mediate light of reason depends on demonstration, knowledge is in this sense defined to be, "the certain cognition of an object, which is acquired by means of demonstration," Then—to quote St. Thomas again—as "Demonstration, which gives us knowledge of a thing, proceeds from its causes."[2] Scientific Knowledge must be closely defined as "a certain and evident cognition of the **causes** of the things known." These causes are of four kinds: (1.)

[1] In lib. i. *Poster.* lect. viii.
[2] Lib. i. *Sent.* dist. xlv. q. 1, a. 3. ad. 5.

efficient, *i.e.*, that which by its action produces the thing. (The word *action* specifies the efficient cause, and marks it off from all other causes); (2.) **material**, *i.e.*, that element in the thing, which is in itself undetermined, viz., matter, but is capable of being determined by another, *i.e.*, by the (3.) **formal** cause or form, which is that which determines matter, and so makes it what it is; (4.) **final**, *i.e.*, that which is aimed at by the efficient cause,—in other words, the end of an action. Thus, a sculptor is the efficient cause of a statue by his action in making it; the stone or marble he works upon, is the matter or material cause of the statue; the shape he gives to it, is its form or formal cause, and is that which *makes* a statue what it is; the end or motive he or his employer has in view, is the final cause of the statue. Viewed without reference to the statue, the stone or marble is, of course, a substance made up of matter and form; the components being the matter; their union or combination, the form; the physical action, which produced that union, the efficient cause, but a secondary efficient cause dependent on and acting directly by the power of God—the first and highest of all efficient causes. There is a great deal to be learned about causes; but this brief indication of their nature will perhaps suffice to make clearer the definition of Scientific Knowledge in its subjective aspect.

Objectively considered, Scientific Knowledge means the collection of ordered truths within a given sphere acquired by demonstration, and *so* known and ordered according to their causes and laws. When we know some few isolated facts or

phenomena in their causes, we may, of course, be said to have a scientific knowledge of them as units; but this does not form Scientific Knowledge as a whole. That can only be attained by placing such known units in their right relations to each other, and so forming them into a united order, developed from and dependent upon some central point of union. This must necessarily be the first principle of a science; and the order dependent upon it, is called a system. Hence Science, or Scientific Knowledge as such, is essentially system, and consequently its essential form must be systematic; for, where there is no system, there can be no science or Scientific Knowledge. Now we can understand why it is called the result of method; for, in forming a system, the first thing to be done is to define the whole and its parts; the next is to make a right division; the next after that is to prove or establish the parts or separate truths, and either to lead them up to, or else deduce them from their first principle.

To sum up: Science or Scientific Knowledge is considered subjectively when regarded as an accidental quality inhering in the person possessing it; objectively, when it represents the objects of such cognition. Hence, as St. Thomas says, "there are three, and three only requisites for science; viz., the active faculty of the thinker by which he judges of things, the thing thought and the union of the two,"[3] *i.e.*, A subjective intellect, an objective fact or truth, and the representation of that truth in the intellect.

The truth or accuracy of a scientific system

3 *De Verit.* q. 11. a. 1, b. 3,

depends naturally on a number of **conditions or rules,** of which the following are the chief:

(a.) First and most important of all, the first principle, on which the whole system depends, must be true, and true as the first principle of the science built up thereon; otherwise the whole system will be wrong, Hegel's first principle, for instance, *i.e*, that thought and being are identical in idea, makes his whole system false.

(b.) We must start from the right point, and use the right method. This we should not do, if, in philosophy for instance, we began from the point—which in fact is an utterly pointless one—of universal doubt; and if we applied deduction and *a priori* arguments to natural science. Thus we should make both the whole as such and all its parts utterly wrong.

(c.) The laws and rules of Definition, Division, and Demonstration or Argument, must not be violated either with regard to the whole or its parts; or else there will be plenty of flaws in the system.

(d.) Every part of the system must be kept in its natural place, *i.e.*, in that by means of which it is in its right relation to the other parts. This is of the very essence of division; and consequent upon it is the caution to avoid digressions. What confusion we should introduce into Logic, for instance, if in treating it synthetically, we studied all about the syllogism before we had learned anything about propositions. And if, in speaking of nominal definitions, we had digressed into a treatise on derivation, how completely out of proportion would that part of the

text-book have been with the other parts, and so with the whole.

(e.) Every part of the system must be set forth with the proofs corresponding to and necessary for it; and nothing needing proof must be admitted there without proof. To this rule, however, every *lemma* is an exception. A lemma is something borrowed from another science, and assumed to be true on its authority. Though, as we use it, it may need proof, we are not obliged to give it; for we have a right to suppose that it has been verified in the science to which it belongs.

(f.) Consequences, which follow immediately from the ascertained chief principles of a system, may be immediately added to them as corollaries, in order to bind together things that are closely interconnected. Corollaries are evident, or at all events practically evident consequences, in which the deduction is so apparent that proof of them is considered unnecessary.

Having seen the conditions upon which the truth of a system depends, we shall be prepared to look at two other things regarding Science or Scientific Knowledge; viz., its Object, and its End.

XXVIII. Object of Science or Scientific Knowledge. Every Science has its determined object, *i.e.*, that about which it treats; and this object may be either **material or formal.** The **Material Object** indicates the matter of the Science considered generically; the **Formal Object** is that particular part or aspect of the Material Object, which the Science professedly contemplates, and which forms its adequate and distinctive "subject-

matter." Hence, it may happen that several Sciences have the same Material Object; yet, as they all regard it under a different aspect, or are specifically given to distinct parts of it, their respective Formal Objects are quite distinct. Thus *man* is the material object of medicine, anatomy, ethics, physiology, etc.; but *man* as a free moral being, tending by his free-will to his constituted end, is the formal object only of ethics.

From this it will be seen that the material object of a Science designates its class; while the formal object specifies the Science, and so differentiates it from all other members of its class. Furthermore, the object—and usually the material object—indicates the degree of superiority or inferiority of a science in the catalogue of the sciences, *i.e.*, their **sub,** or **super-ordination** with respect to one another. Thus experimental are subordinate to mental sciences; and of two experimental sciences that one ranks higher whose object approaches more nearly to the suprasensible, *e.g.*, language as the immediate expression of thought is higher than physical science; while among mental sciences the speculative rank higher than the purely formal, *e.g.*, Philosophy is superordinate to mathematics; and at the summit of Philosophy, and so of all sciences, stands the science of Metaphysics, because it has to do with those things which are most of all others intelligible, *i.e.*, being and those things which follow from being, whence its name of Metaphysics, *i.e.*, beyond physics; the first causes of things, whence it is called First Philosophy; God and the intelligences, whence it is termed the

Divine Science. (See the *Proœmium* to St. Thomas' Commentary on Aristotle's Series of Treatises on Metaphysics). In Metaphysics then we find the watch-tower to which Bacon refers, when he tells us that, if we would grasp and understand any particular science, we should not "stand on a level with it, but climb up, as it were, into the watch-tower of some other science," and thus place ourselves in a position to take in all its parts.[4]

In speaking thus of the subordination of the sciences, and claiming the presidency for Metaphysics, it must be understood that we have only in view the sciences acquired by processes of reason. Dogmatic Theology, which is in its very nature paramount, belongs to an altogether different order; and, though it cannot run counter to science, has an object, a basis, and a source altogether different from those of science.

Quite distinct from the Subordination of the Sciences, which implies no interconnection whatever, is the **Subalternation** of Sciences, which consists in the fundamental dependence of some sciences on, and hence of their inferiority to others. This takes place when a science, having no axiomatic or self-evident truths for its first principles, borrows principles from some higher science, called the subalternant or governing science in reference to the inferior of subalternate. They are taken for granted by the lower, because they are scientifically proved by the higher science. Thus perspective and music borrow their first principles from the higher science of mathematics. Where such dependence exists,

4 *De. Aug. Scient.*, Works, vol. i. p. 460, ed. 1857.

the material object of both sciences is the same; but in the inferior science a certain difference is added, which suffices to constitute a specially distinct formal object; *e.g.*, *number* forms part of the formal object of mathematics, *sounded number* is the formal object of music. In like manner, the *line* enters into the formal object of mathematics; the *visual line* is the formal object of perspective.

XXIX. End of Knowledge, or Science. Primarily, the end of science can be nothing else but the attainment of Truth, and this should always be its first and highest aim. It is sometimes called the **theoretic,** in contradistinction to the secondary end, which is distinguished as **practical,** and consists in the endeavour to further the interests either eternal or temporal of mankind,—an endeavour which cannot be realized by science except through the realization of its primary end, *i.e.*, the attainment of Truth. Equally true is this of what, consonantly, to the distinction between the subjective and objective aspects of Scientific Knowledge, may be called its **subjective** end, which has been apophthegmatically expressed in the saying that "Philosophical, or Scientific Knowledge is its own end," a proposition developed in Cardinal Newman's sixth discourse on the Nature and Scope of University Education. The reason has its foundation in our very nature; and, according to Aristotle, is threefold. First, because everything naturally desires its own perfection; and hence the intellect being *in potentia* with regard to knowledge, and being only brought into act by its means, naturally deserves it. Secondly, because everything has a natural inclination towards

its proper operation; and hence, as the operation proper to the intellect is to understand and reason, man is naturally drawn to understand, and consequently to know. Thirdly, because everything seeks to be united with its principle; and man is not united to the principles of human intelligence save by means of intellect. Hence it is not vain to seek science for its own sake apart from utility, for a natural desire cannot be in vain; and its realization satisfies an actual need of our nature. We all remember the line: "*Felix* qui potuit rerum cognoscere *causas*." Here we have subjective scientific knowledge and its subjective end; while both the one and the other connote *that*, without which they would at once cease to be, viz., Truth and Certainty; and so we come at last to the **End of the Act of the Agent**, or **Material Logic**.

C.

THE END OF THE ACT OF THE AGENT,

OR

MATERIAL LOGIC.

CHAPTER I.

I. Material truth of thought. II. Relations of the mind to Truth, viz., Ignorance, Doubt, Opinion, Certainty. III. Kinds of Certainty.

In tracing the plan of this little work, we saw that the end of the act of the agent in logic consists in the **attainment of truth and certainty**; and so, in treating of that end, we have to consider:

I. What the material truth of thought is, and what error is.

II. The fourfold relation in which our minds may stand in regard to Truth, viz., Ignorance, Doubt, Opinion, and Certainty.

III. The Kinds of Certainty.

IV. The Sources of Knowledge, as means of attaining Truth, and as motives of Certainty.

V. The Criterion of Truth and Principle of Certainty.

VI. The Laws or Rules on which depends the Material Truth of thought.

I. Material Truth of Thought. As distinguished from the Formal Truth of Thought, which consists in the conformity of the thought with the formal laws of thought, and so is sometimes called "Logical Truth," Material Truth is defined, "the **conformity** of the mind with the object," or, to

put it more closely, the conformity of the judgment formed by the intellect with the object of such judgment, *i.e.*, a correspondence between the representative thought and the represented object. Hence its name of **Conceptual Truth** in contradistinction to purely Logical Truth; while both are essentially Subjective Truth, *i.e.*, Truth existing in the mind of the thinker. It is obvious that Conceptual or Material Truth does not require an exhaustive representation of the object of Thought, and certainly does not suppose any full knowledge of, or absolute resemblance to it. This would be utterly impossible to such limited cognitions as ours must be in this life. All that is needed is, that what we know of the object should actually correspond to it; just as a photograph corresponds to the person it represents, though it does not show the whole of the person, nor is there any absolute resemblance between the glass or paper bearing the portrait, and the flesh and blood of the person.

Material Error, as opposed to Material Truth, consists therefore in a want of correspondence between the object as it really exists and as the mind conceives it to exist, *i.e.*, between the judgment of the intellect upon the object and the object itself; hence in a **difformity** between the thought and its object; but not in the incompleteness of the thought.

From this it will be evident that Material Truth belongs primarily to the judgment pronounced by the mind in joining together ideas, not in the inadequate representation of the object

in the first instance; for until some sort of judgment has been formed, the thought cannot yet be said to be either conformable to the external object, or wanting in such conformity. And it is the same with error, which resides in the judgment, and not in simple apprehension. The reason is this. Material or Conceptual Truth consists, as we have seen, in a conformity—hence an equation—between the intellect and its object. But conformity is not identity, because an equality of *distinct* things; hence there must be a difference between the representing thought and the represented object. In simple apprehension there is no such distinction discoverable, for the concept is merely an intellectual transcript of the original; hence there is identity between the representation and the represented. Not so in judgment or statement, which, as judgment, has no counterpart in the thing represented, in which there is no separation, while in a judgment there is the separation into subject and predicate, and there is also the copulative verb *to be*, which is altogether excluded from the object represented. Hence a conformity or equation is possible, because there is a distinction. This explains too why error is called "Assent to a false proposition," or "Dissent from a true one;" assent and dissent essentially implying a judgment of the mind.

As conceptual Truth resides primarily in the judgments of the intellect, as the judgments of the intellect are of many kinds, and, being acts, are differentiated by their object, it follows

that there are many classes of conceptual truths. Chief among them are the following:

(1.) **Truths supra-rational and rational.** Rational truths are such as we come to know either immediately or mediately by means of reason, and in the latter case are able to prove by argument. Supra-rational truths, on the contrary, are such as we could never know either immediately or mediately by the light of reason, nor prove to demonstration by its principles when we have obtained the knowledge of them by means of Revelation. Who can know from reason, or give demonstrative proof, for instance, that God while one in essence is three in Person? But it is an immediate truth of reason that a thing cannot be and not be in the same relation; and the rational truth that God exists admits of strict syllogistic proof. We may here draw attention to the distinction between judgments that are **according to reason** and those that are **contrary to reason.** Of these the first-named are in accordance with rational principles and truths, while the second are in direct contradiction to them; *e.g.*, a circle is identical with a triangle; a part is larger than its whole. Now what is contrary to reason can never be true. Supra-rational truths, consequently, must be according to reason. They are so either negatively or positively; negatively when it can be demonstratively proved that they are not in contradiction with rational principles and truths; positively when, by arguments from congruity, they can be shown to be in actual harmony with rational truths.

(2.) **Truths necessary and contingent.** Neces-

sary truths are propositions whose contradictory cannot possibly be true. They are absolutely necessary when this contradictory can be true under no condition whatever; *e.g.*, there is no effect without a cause; they are hypothetically necessary when the truth of the contradictory is impossible only under certain conditions, *e.g.*, man cannot live without air, because God has made it a condition of his physical life. Contingent truths, on the other hand, are propositions whose contradictory, considered simply in itself, might be true; *e.g.*, the world exists, because the world, as contingent, might at any moment cease to exist.

(3.) Truths a priori and a posteriori. Propositions of which we have only to know and compare the component terms, in order to recognize their truth, are called *a priori* truths, *e.g.*, the whole is greater than one of its parts. Such truths are as such always universal and necessary. Propositions for which we require some further reason than this comparison of terms, in order to recognize their truth, are called *a posteriori* truths, *e.g.*, heat extends bodies. These truths may be universal and necessary; but they are not always so; *e.g.*, this blotting-paper is pink, is both singular and contingent; and the universal proposition, Heat extends bodies, is only hypothetically necessary.

(4.) Truths analytic and synthetic. In an analytic truth the predicate attributed to the subject is virtually contained in the concept of the subject, *e.g.*, a circle is round: in a synthetic truth the predicate lies beyond the concept of the subject, and hence the reason why the predicate

is attributed to it cannot be sought for in the subject itself, *e.g.*, the earth moves round the sun.

(5.) Truths ideal and experimental. In the former the matter of the truth is suprasensible, *e.g.*, God is eternal Wisdom; in the latter it is gained by means of immediate experience, *e.g.*, boys are noisy, some old people are fidgetty.

(6.) Truths mathematical, physical, and metaphysical. Mathematical, *i.e.*, a proposition relating to a mathematical quantity or power, *e.g.*, twice three are six; physical, *i.e.*, a proposition expressing some physical law, *e.g.*, a body at rest remains at rest until set in motion; metaphysical, *i.e.*, a proposition referring to the ultimate reasons or first causes of being, *e.g.*, the human soul is a spiritual being.

7. Truths moral and religious. The matter of a moral truth relates to the moral order; the matter of a religious truth relates to the religious order; *e.g.*, we must be just to all men, is a moral truth; we must honour God, is a religious truth.

(8.) Truths theoretical and practical. Theoretic truths refer to being as such, *e.g.*, every effect has a cause; practical truths relate to action, *e.g.*, charity to others is a virtue to be cultivated.

These various classes of truths form the principal matter of our cognitions; and from them we pass on by a natural transition, to consider the

II. Attitudes of the mind with respect to Truth. The relation in which our minds stand with regard to Truth is a fourfold one, viz.:

(1.) Ignorance;

(2.) Doubt;

(3.) Opinion;
(4.) Certainty.

(1.) Ignorance, or complete absence of any knowledge of a truth, is clearly enough not a positive, but a merely negative relation of the mind towards truth; or, more exactly, no relation whatever, but the absence of such relation. It is universal until the faculties of cognition in man become active; and after that it is in every mind partial, for it is impossible to know all truths, and we must necessarily be in ignorance of those of which we know nothing.

(2.) **Doubt** is either objective or subjective; **objective** when it is in the proposition, *i.e.*, when a proposition is based on grounds which do not exclude the possibility of its contradictory, and so which prevent the proposition itself from being received as a demonstrated truth. **Subjective,** or mental doubt, is the state our minds are in when we cannot choose between two contradictory propositions, because *to us* the reasons adduced for neither of them exclude the possibility of their contradictory; hence it is called, a state of mind in which we suspend assent for fear of falling into error. "This takes place," says St. Thomas, "either because the mind sees no reason for assenting to either contradictory; or because the reasons for assenting to both appear to be of equal weight." [1] In the first case the doubt is **negative;** in the second, it is **positive.** To both applies St. Bonaventure's description of doubt, viz., "the indifference of the judgment to two contradictories, so that it chooses

[1] *De. Ver.* q. xvi.

neither in preference to the other."[2] The terms **reasonable** and **unreasonable** doubt speak for themselves.

(3.) **Opinion,** like doubt, can be considered either objectively or subjectively. Taken **objectively,** an opinion is some proposition, for the truth of which there are sufficiently weighty grounds to induce an upright sensible man to accept it as true, though all possibility of the truth of its contradictory is not excluded. **Subjectively** considered, opinion is the state of mind we are in with regard to such a proposition. We hold it to be true, because we think the reasons which go to prove its truth are sufficient to do so; but we are not quite free from the fear that its contradictory may turn out to be true. Whence such a mental state may be called—an assent of the intellect to one of two contradictories, yet with the fear that the one not assented to may be true; or, as St. Thomas puts it[3] "that state in which the mind adheres to one side of the question, yet with fear of the opposite." It adheres to one side, either because it sees the reasons for that side only, or because—seeing the reasons for both sides—it holds that they are more cogent for one than for the other. Yet it fears the opposite, because the reasons, in both cases, are not such as to produce steady unqualified assent to the proposition. Examples of this are constantly met with in persons whose struggles with their opinions keep them out of the Church long after they have felt the insecurity of their position as heretics or non-believers. Their

[2] In lib. iii. *Sent.* dist. xvi.

[3] 2a. 2æ, q. ii, a. i, c.

belief in their own system has come to be a mere opinion joined to a very real fear that what is attracting both heart and intellect to the Church may be true. And then, when they reach the stage preceding the conviction which in most cases of conversion goes before and prepares the way for the gift of Faith, the position of their opinion is sometimes reversed. They think they see sufficient reason for joining the Church, but fear that what they are leaving may after all prove to be true. That there should be many degrees of probability in opinions, is of course natural and necessary; and it is only rational to accept a more probable opinion on any matter in preference to one less probable. Objectively, the degree of probability attaching to an opinion, depends upon the force of its sustaining reasons *per se;* subjectively, it depends upon the mind's apprehension and acceptance of those reasons; hence our expressions, that opinion *commends itself to me* as highly probable, I have *strong reasons* for holding this opinion, etc.

(4.) Lastly, we come to **Certainty,** which is **objective** as a quality of propositions, and subjective as a state of the human mind. A proposition is objectively certain when the reasons adduced for its truth exclude the possibility of its contradictory. Hence objective certainty must be synonymous with Truth, or rather what is *per se* certain must be true. **Subjective** certainty or certitude (which is the primary signification of certainty) is a term with two meanings. Strictly speaking, it is an attitude of the mind towards Truth, and hence may be defined the firm adhesion of the mind to a *true* proposition

without fear of error. Hence again subjective certainty is in this restricted sense necessarily conjoined with truth. But subjective certainty in its wider sense is that mental act or state of mind in which we are free from doubt, and firmly adhere to the object of our mental act; or, more shortly, a firm adhesion of the mind to its object without any fear of error; and that object is distinctly specified by St. Thomas when he defines certainty as "that state of the mind, in which it adheres to any judgment without fear of its opposite."[4]

Subjective certainty is therefore, in this wider sense, evidently neither synonymous with, nor by any means always conjoined with truth, for the patent reason that it is an adhesion of the mind to what is, in its very nature, fallible. Supposing someone were to call this in question, and to say that we cannot be subjectively certain of what is not true, we can answer him thus: Our proposition, that subjective certainty is not necessarily conjoined with truth, is either true or false; supposing it for the sake of argument to be false, our subjective certainty that it is true would prove it to be true, because we adhere to the judgment, of which the proposition is the sign, without any fear of error. Examples of adhesion to false judgments might be multipled *ad infinitum;* and our own daily experience proves only too surely that we are subjectively certain, *i.e.*, internally sure we are right, when we are actually very wrong indeed. Such adhesion to false propositions may be called a false assurance of certainty in con-

4 In lib. iii. *Sent.* disp. xxvi.

tradistinction to subjective certainty strictly so called, which necessarily connotes truth.

That ignorance, doubt, and opinion are, like certainty in its wide meaning, attitudes of the mind with respect to error as well as to truth, is almost too obvious to call for mention; but it may be useful to advert to the reason, which is that conceptual truth, of which alone we are now treating, resides in the judgment, and so does error. Ignorance of error speaks for itself; as there are many truths of which I am not cognizant, so too is my mind a blank with regard to many errors. And when, in doubt, we are placed between two contradictories, and suspend assent for fear of falling into error, we are in a neutral if not negative position with regard to each contradictory, and of two contradictories we know that one must be false. Opinion likewise, considered subjectively, inclines to error as well as to truth, either because we are blind to the reasons for the true proposition, and think we have reasons for its opposite; or because in weighing the reasons for each of the opposite opinions, personal motives incline us to accept as genuine the fictitious cogency of reasons for holding a false opinion. If experience proves that assurance of certitude can attach itself to erroneous judgments, much more, from the very nature of the case, is opinion likely to be sometimes allied with error. We pass next to consider the different

III. Kinds of Certainty. We have seen that Certainty, though fundamentally subjective, is often applied in a secondary sense to the object of certitude; *e.g.*, nothing is more common in ordinary conversation than the expression, "You may take that

for a certain fact," and other similar phrases. Considered **objectively** then, Certainty is **absolute** when a proposition is unconditionally certain and unconditionally excludes its contradictory; **hypothetical,** when a proposition is only conditionally certain, and so only excludes its contradictory under certain conditions. Further, objective certainty is **metaphysical** when the contradictory of the certain proposition is intrinsically impossible because involving an intrinsic contradiction, *e.g.*, the whole is greater than its parts, is metaphysically certain because its contradictory is intrinsically impossible; hence a proposition that is metaphysically certain is unconditioned and necessary. A proposition is **physically** certain when its contradictory is physically impossible, because opposed to the laws of nature, which are conditioned by the will of God; and a proposition is **morally** certain when its contradictory is morally impossible because opposed to the general and constant experience of mankind, which is conditioned by the will of God remotely, and by the will of man proximately. So much for Certainty as a quality of propositions. We have now to regard it **subjectively,** that is to say, as a quality of the mind, or **as Certitude.**

Passing by, as already sufficiently exlpained, the distinction between true and false certainty, we find that subjective, like objective certainty, may be:

(1.) (a.) Metaphysical; (b.) Physical;
(c.) Moral. Moreover, it may be:
(2.) (a.) Natural; (b.) Scientific:
(3.) (a.) Natural; (b.) Supernatural.

(1.) The internal conviction that we are right may have three separate bases, viz.:

(a.) I may think that the contradictory of the proposition I hold to be true, is absolutely and wholly false, as opposed to the very nature of things; and then I have **metaphysical certainty,** which is unconditioned, and admits of no exception. I am metaphysically certain that a just man cannot at the same time be unjust, that men are rational animals, that a whole is greater than one of its parts, etc.

(b.) Or I may think that the contradictory of my proposition is false because opposed to the laws of nature, *i.e.*, of external material nature; and then my **certainty** is **physical,** and conditioned by the First Cause of those laws, *i.e.*, by God Himself, Who can interrupt their uniform course either directly, as He does in miracles, or indirectly by the counter-action of some other natural law. Thus, when General Gordon was in the Soudan, I was physically certain that he was not at the same time in St. Louis; though, if he had had the miraculous gift of bilocation, he might have been in both places at once. And the son of Tobias was physically certain that the person with whom he was travelling was a mortal, and he had no apprehension of the contrary, although the person was really an angel in human form.

(c.) Or I may think that the contradictory of my proposition is false because the whole experience of mankind is against it, or because such things never do happen (though they might do), or because it is improbable, so utterly improbable

as to amount in practice to impossibility; and then I have a **moral certainty,** conditioned not merely by the Divine, but also by the human will, and so not free from exceptions. In actual usage the term Moral Certainty is generally taken to mean the highest degree of probability, and so propositions are called certain, which are in point of fact merely opinions, though opinions for which there is every sort of probability. This is one of many instances in which the boundary-line between two kinds of mental acts is so exceedingly fine, that it is hard to tell when it has been overpassed. But I am morally certain, in the real signification of the term, that the Turkish army is not at present landing on the coast of England, and that the English will not willingly yield Gibraltar, though there is nothing either in the nature of things or in the physical laws of the world to make me think either proposition impossible.

This examination of its separate bases points clearly to the conclusion that subjective certainty must admit of degrees; yet degrees may at first sight appear incompatible with the nature indicated by its definition. This incompatibility, even if apparent, is not real. Recalling the definition of Subjective Certainty in its wide meaning, viz., a firm adhesion of the mind to its object without any fear of error, we see that there is in it a double element—a negative and a positive element. The negative element consists in the exclusion of all fear of error; and in this point lies the essential distinction between certainty and opinion. So far as this negative element is concerned, we cannot

allow of degrees. There is either fear of error or there is not. If there is the slightest such fear, certainty is impossible. But there is a positive element in the definition, viz., the adhesion of the mind to its object. Now here we can, and we *must* admit of degrees; for, if what has been advanced regarding the bases of certainty be true, the adhesion of the mind must be firmer or less firm according to the force of the motive for such adhesion. No one will question that the force of the motive is stronger in metaphysical than in physical, and stronger in physical than in moral certainty; and so the order of degrees speaks for itself.

(2.) Further Subjective Certainty may be natural, or scientific. It is

(a.) **Natural** when we are sure of a thing without having gone through a scientific proof of its truth; *e.g.*, I am naturally certain that the fire which is roaring up the chimney when I come downstairs must have been laid in good time in the morning; I am naturally certain that, if it is a fine afternoon, I shall go out and play cricket.

(b.) **Scientific,** or, as it is sometimes called, Philosophic Certainty, is the kind of certainty we have of a proposition of which we have demonstrated the truth by argument, *e.g.*, Brownson had a scientific certainty of the existence of God when he had proved the truth of this proposition to his own mind by means of argument.

(3.) Natural Certainty has another meaning again, in contradistinction—that is to say—with supernatural. Certainty is

(a.) **Natural** when it is based on natural grounds or motives, or on natural evidence (of which more will be said later on);

(b.) **Supernatural,** when it is based upon a supernatural motive, *i.e.*, the veracity of God Who reveals Himself to us; or upon a supernatural principle, viz., the supernatural light of the gift of faith.

Obviously enough, natural, as opposed to supernatural certainty, and as including the various other kinds of certainty enumerated, is the aspect of the subject of which we are primarily treating; and, as Natural Certainty is based on natural grounds or motives, and is dependent upon natural conditions, they must form the next point of our inquiry.

CHAPTER II.

IV. Sources of Knowledge as media of Truth and motives of Certainty.

IV. Sources of Knowledge, as **Means of attaining Truth,** and as **Motives of Certainty.** A source of knowledge, in general, is that by which, on the one hand, we come to know a truth; and, on the other hand, that by means of which we are certain of the truth we have come to know. Hence the sources of knowledge have a double character and a twofold signification. In their first aspect, as they give us the knowledge of Truth, they are means or more properly *media* of knowledge, and organs or channels through which we know its truth; hence their name of criteria of Truth *per quod*, *i.e.*, instruments by

which we gain Truth. This use of the word "Criterion per quod" must not be confounded with the "Criterion secundum quod," which is the Criterion of Truth properly so called, and will be treated of in the next article. In their second aspect, the Sources of Knowledge, by guaranteeing its truth, and as conditions of its certainty, are the motives upon which we base our certainty of the truths they have communicated to us. This will be made clear by looking at these sources of knowledge separately.

As all our knowledge comes to us through Experience, Reason, and Authority, these must consequently be its three main sources, and the motives upon which all certainty depends. Now

(1.) Experience is twofold, viz.:

(a.) Internal, in self-consciousness;

(b.) External, by means of the external senses:

(2.) Reason, in the wide meaning of the term, acts

(a.) on the one hand intuitively and discursively;

(b.) and, on the other, in what is called "common sense:"

(3.) Authority finally is either

(a.) human; or

(b.) divine.

This gives us in all six sources of knowledge, six channels of truth, six guarantees or conditions of Certainty, which have now to be examined as such. Thus, we shall have first to take each source of knowledge briefly considered in itself as such; next we shall have to ascertain the periphery or extent of the truths we get to know

by its means; after that, we must see how and under what conditions it guarantees the truth of the knowledge it conveys; and lastly, we must show how it is a motive for our certainty regarding such knowledge. We shall see, as we go on, that the proofs adduced have neither the value nor the meaning of real demonstration, which, moreover, is itself a source of knowledge (reason acting discursively), and so cannot serve as a proof of the rest without making the argument either a vicious circle, or begging the question. What has to be done is to show, or rather to explain to what extent the sources of knowledge cannot deceive us under certain given conditions, and thus to make the natural certainty we have of their trustworthiness clear to our own minds, *i.e.*, to make it into a scientific certainty, which is still, be it remembered, natural in contradistinction to supernatural.

Experience.

(a.) **Internal experience, or self-consciousness.** In describing the way in which we form ideas,[1] mention was made of the "sensus intimus," which is the faculty by means of which we know (are conscious of) the internal acts of our physical life both in the sensible and intellectual order, and consequently know both our personal identity and personal existence. The action of this faculty obviously results in self-consciousness, by which we reflect on the first perception of our internal acts, and so become conscious of such perception.

The **truths** we get to know by this means are:

[1] See pp. 10, 11.

(*a.*) internal acts whether sensible or intellectual, *i.e.*, the acts that take place *hic et nunc* within us; not past acts that we recall by means of memory, nor the causes of the present internal acts;

(*β.*) personal identity and personal existence. I know that I exist because I am conscious of myself as a real personal being; and this is the only means by which I possess this knowledge.

As to the **certainty** or **trustworthiness** of this source of knowledge, it does not admit of doubt to any reasonable mind. To such a mind there can be no error or deception in the matter; and the impossibility of such deception is not difficult to explain:

(*a.*) I cannot doubt the certainty of the testimony of my consciousness without at the same time admitting it by the act of doubt; for, if I doubt my existence, for instance, I admit by this very doubt that I exist, for unless I existed I could not doubt. In doubting I presuppose thought, for without thought I could not doubt, and without existence I could not think.

(*β.*) There can only be deception where the known is really different from that which knows. There are many reasons why I may not always apprehend objects distinct from myself, as they really are; but, supposing that men have the use of reason, it is inconceivable that there should be deception where the things known and knowing are in fact one and the same, as in the case of self-consciousness, self being conscious of self.

(b.) **External experience,** by means of the **external senses.** External experience depends upon

the external sense, or sensation, a faculty which hands into our minds the report of the external senses about the qualities or phenomena of which their organs have received the impression.

The **objects** of which we have knowledge by means of sensation are:

(*α.*) External qualities and phenomena of bodies;

(*β.*) rest and motion of bodies;

(*γ.*) the existence of bodies. Only by means of the external senses can we know that bodies exist outside of us. But it must be noted that we only know these external facts by means of sensation in the *relation* in which they stand to us as sentient beings, and according to the impression they thus produce upon us. Hence the appearance of an object depends upon the state of the sense which perceives it, and upon the way in which we apply the sense to it. If, owing to illness or any other cause, a sense is in an abnormal condition, the impression it hands in to be transferred to the imagination as a picture, will be a false one, *i.e.*, it will not correspond to the object it tries to represent. *e.g.*, to the jaundiced all things look yellow; to the deaf clear sounds come confusedly. And a false impression will be produced too if the sense is not attentively applied to its object.

Hence the **trustworthiness** of the senses as sources of knowledge **depends upon certain conditions,** which belong partly to the sense itself, and partly to the judgment formed concerning the object perceived, and based upon its sensible perception. Those which relate to the **sense** are:

(*α.*) The object must be in a right relation to the

sense; *e.g.*—with respect to the eye—it must be neither too near nor too far away, or a too strong or too weak impression will be produced, and lead to deception. Then the medium between the sense and the object must be a congruous one, so that it may not hinder a correct perception. No one, for instance, would put on blue glasses in examining an oil painting, or wear gloves in feeling a person's pulse.

(*β.*) The sense must be sound and in a normal condition, if it is to tell the truth; *e.g.*, a short-sighted person will not see much of the fan-tracery vaulting in Gloucester Cathedral; his defective sight will only take in an indistinct inaccurate impression, unless he remedies the defect by wearing spectacles.

(*γ.*) The application of the sense to the object must be attentive. A cursory glance at Bath Abbey Church, for instance, will not give me a distinctive and so a correct impression of it.

With regard to the **judgment** passed on the object of sense:

(*a.*) We should not judge of an object, nor attribute any quality to it, until we have ascertained that all the necessary conditions for ensuring the trustworthiness of the sense are fulfilled.

(*β.*) We must not extend the scope of the perception of sense beyond its natural limits, *i.e.*, as the senses only perceive the external qualities and phenomena of objects, we cannot, merely from such perception, judge of anything which it does not comprise, *e.g.*, of the nature of the object, or of qualities in it which do not fall under the senses. It is true that further inquiries on such points are

based on the immediate perceptions of sense, but they do not form part of it.

(γ.) Lastly, we must be careful not to consider a sensible quality *as such* to be an essential quality of a body, though it may sometimes prove on investigation to be so; nor should mere appearances be taken for realities until verified as such.

But, above all, sense must be under the control of reason, which has to give to the perceptions of sense their right value and their true signification, and at times to act as their necessary corrective. When this control is neglected, there is sure to be danger of deception by the senses, though its cause is not to be laid solely at their door, but rather must be attributed to reason when she judges of the object of sensation without observing the conditions upon which depends the truth of her judgment.

Taking these conditions for granted, however, the accuracy and **trustworthiness** of the certainty given by the senses, admits of no reasonable doubt; because—

(α.) If, under such conditions, the senses could deceive, the cause of the deception would lie in the sensible perceptive faculty itself, which would thus *by its very nature* fail to answer its end. But this cannot be, for every natural faculty is proportioned to its natural end, and must attain it, if no obstacles are placed in its way, and if it acts in the right manner.

(β.) The same principle applies to the judgment formed on the testimony of the senses. If it is limited to the exact objects of their perception, it cannot deceive, unless on the supposition that the

faculty of judgment does not answer its end, and so by its very nature implies deception, which is obviously absurd; *e.g.*, when I state, on the authority of my senses, that I am writing with black ink on white paper, that there is a cart rumbling in the distance, that someone is scratching away with an unmended quill within a few yards of me, I cannot be deceived if I observe the conditions required in forming all these judgments.

(γ.) The universal belief of mankind, with the exception of some few crotchet-nurses, does not admit of the least doubt of the trustworthiness of the perception of the external senses; indeed people have no surer ground for their certainty concerning acts perceptible to sense, than that they have themselves seen or heard them done.

(2.) **Reason.** By means of reason, considered as a source of knowledge, we obtain knowledge of what lies beyond immediate sensible experience, and is in this sense supra-sensible. Thought, or the action of the intellect, is—as we saw in speaking of the "agent of Logic"—based upon, or rather sets out from experience, but rises above it into the higher sphere of the supra-sensible and transcendental. Truths belonging to this sphere are called truths of the intellect, or truths of the reason, in the wide sense of the term. Now, to know that these truths are true, reason must apprehend, *i.e.*, *see* their truth; and this can only be done by knowing the *reason* why the judgment or proposition enunciated about them is what it is, and not other than it is. Such knowledge may be either clear and well ordered, or obscure and confused. In both

cases it may form the basis of a judgment; but in the first case we judge according to the light of reason; in the second case we judge according to "common-sense." Hence the subdivision of Reason as a source of knowledge.

(a.) With reference to what has been said, the **discernment or light of reason** may be defined, the apprehension of the truth of a proposition by means of clear systematic knowledge of the grounds upon which its truth depends. This definition tallies pretty nearly with that of subjective scientific knowledge;[2] and now we cannot fail to see why, in anticipation of this further meeting with it, it was on first acquaintance rather summarily distinguished from experience and faith. Subjective knowledge was then shown to be either immediate or mediate; and so therefore must be the discernment or light of reason, which is immediate in **intuition,** where the ground of the truth of a proposition is perceived at once without any process of reasoning; mediate in syllogistic **reasoning,** either **inductive or deductive.**

Thus the **truths** obtained by this source of knowledge are:

(*α.*) All first principles, or self-evident truths: these we get by intuition.

(*β.*) All truths of the intellect or reason obtained by means of induction and deduction.

We see then that reason is only a limited source of knowledge, and does not give us the mysteries of faith, which we can only come to know by means of Divine Revelation.

But is the discernment of reason **trustworthy,**

[2] See p. 142.

and so is it in its mediate and immediate judgments a motive of certainty? Without begging the question, we cannot make an argument answer this query; but it is possible to show to what extent there is no possibility of deception in this source of knowledge:

(*a.*) First of all, with regard to intuition,—in a proposition whose truth I perceive immediately, the predicate and its relation to the subject are obtained immediately by an analysis of the subject itself; *e.g.*, the whole is greater than its part. When I know what the subject is, *e.g.*, the whole, I possess in that knowledge both the predicate and its relation to the subject, as is evident in the given example; and my judgment is nothing but the transference of this relation to my thought. Here then is no possibility of deception. If there were any such possibility, if I were able to doubt or deny what I intue, or immediately apprehend as self-evident, I should have far greater reason to deny or doubt what I do not cognize as self-evident.

(*β.*) Then, with respect to mediate discernment obtained through syllogising, there will be no deception if two conditions are observed, viz., the principle from which the argument proceeds must be true, and the syllogism itself must be both materially and formally true. When this is secured, the conclusion must of necessity be true, as has been shown elsewhere.

(b.) **Common Sense**, a much maligned property, which most people claim as their own, while they disbelieve in its possession by any one who happens to have the misfortune, or perhaps the "pluck" to

differ from them, is one of those terms which serve to cloak many false meanings. It does not consist in personal infallibility in daily life, an impossible quality existing only in the self-estimation of the self-righteous; nor is it an exclusive gift belonging solely to some age or clique. Old folks must not say its monopoly is in their heads; still less can such a claim be set up by the young or middle-aged; and least of all is it true of those too numerous specimens of humanity, who make "common-sense" a synonym for their own mental obtuseness, and are usually endowed with the rough bluntness which is fast usurping the name of true simplicity. Common sense is a gift of our common human nature, hence a gift given to all, though in varying degrees—*sensus naturae communis*—and has been not unhappily described by an American writer as "reason in her every-day dress." It may be defined as that natural quality of the human reason, by means of which it forms certain judgments, and holds them to be true, without knowing clearly and systematically upon what grounds the truth of such judgments depends. Of course, an argument in disguise really underlies them; for we do not judge blindly; and the judgment of common sense is not purely instinctive; but as the reasoning is not explicit, we are not clearly conscious of it. In this way our minds apprehend many truths without going through scientific investigation and argument; and so common sense cannot be omitted from the enumeration of the Sources of Knowledge.

It is undeniable that among all people and in all ages a constant uniform judgment has prevailed

regarding certain truths which have a great influence on daily life, and which are of such a nature that without a knowledge of them it would be impossible to lead a really rational and moral life. Such unvarying uniformity of judgment must have a constant uniform ground, and this can be found nowhere but in the rational nature of man, which is essentially the same among all people and in all ages. The judgment proceeds from this common nature by means of a faculty which does not judge from blind instinct, but with rational thought, though without clearly apprehending the reason why it judges truly, or putting the hidden reason into argumentative form; and this we have seen to be common sense.

The **truths** which come to our knowledge by its means are confined to certain truths of the intellect or reason, which belong *per se* to the mediate perceptions of reason by argument. Hence the teachings of experience and the first principles gained by intuition do not fall into this category, which includes only such mediately known truths of the intellect as are closely related to our practical life, in so far as such knowledge is necessary to us if our practical life is to be rational and moral. Such truths, for instance, are—the existence of God; our duty of paying Him religious honour (the idea of Divine Unity is really at the bottom of every form of polytheism; and atheists are, compared to the mass of mankind, abnormal and exceptional, and moreover have an unerring tendency to develope into theists, or rather to show their true colours and honestly own to the belief of which they have never

rid themselves, when danger threatens in the shape of a storm at sea, a great conflagration, &c.); that there is an essential difference between good and evil; that reward or punishment awaits us in the next life; that parents are to be honoured; that man has a free will; that we must be just in business transactions; that physical ills may be remedied or alleviated, &c. All these things obviously admit of syllogistic proof, but we are certain of them with a natural certainty (q.v.), without any scientific proof of their truth.

To know whether in any given case a truth comes to us by way of common sense, we must be sure that it fulfils the following **conditions**:

(α.) that it can fall within the sphere of common sense;

(β.) that it is either actually or virtually the constant uniform judgment of all people and ages, hence has their common consent—*consensus communis*—which is strengthened instead of weakened by the progress of civilization. *Consensus communis* is not identical with *sensus communis*; it is its indicative mark.

(γ.) The judgments which depend on common sense must not be opposed to the first principles of reason, but on the contrary be further confirmed when these principles are applied to them, as is the case with the examples given.

If these conditions are observed, the **trustworthiness** of common sense as a motive of certainty is beyond all doubt. It cannot deceive us; and this is made clear by its very essence. If common sense could deceive us under the given conditions,

the cause would lie in our rational nature as such; and so we should be assuming that reason was, not *per accidens*, but in its very nature leading all mankind through every age into false judgments, and so into error, which would be manifestly absurd, and do away with the certainty of all knowledge.

From what has been said on the vexed question of common sense, it will be seen that its most accurate popular meaning, which may be loosely described as being "all there" in matters practical, does not differ substantially from what may in contradistinction be called its scientific meaning, which is quite wide enough to include the sober intelligent apprehension of men and things, that is, put into practice by being "all there."

(3.) **Authority,** as a source of knowledge, proceeds from the credibility of the person who testifies, and this again depends upon his knowledge and veracity; for the clearer it is that he possesses adequate knowledge of the truth or fact, and that his integrity is reliable, the more ready are we to credit his testimony, inasmuch as he is its security.

As the result of the discernment of reason is scientific knowledge, so is faith the correlative of authority, and, as the acceptance of a thing as true on testimony, it is defined: the assent by which we hold as true things proposed to our belief, on the authority of the person who affirms them. Therefore, presupposing his credibility, faith may be as good a ground for certainty as is scientific knowledge; but, in the absence of this condition, faith must give place to more or less probable opinion (q.v). It may be worth while to call attention to the

implied consequence, that belief and opinion are essentially distinct, though they are often used interchangeably in ordinary parlance.

In Authority, as a source of knowledge, the person who testifies, and who is the security for what he affirms, is called a witness; and his communications form his testimony. The witness is either Divine or human, God or man; and hence the division of authority under its present aspect.

(a.) **Human Authority.** The **truths** we get to know by means of this source of knowledge are of two kinds:

(*a.*) Theoretic and practical propositions which in themselves are ascertained by reason, but which may be also attested by human authority;

(*β.*) Facts of experience which, either owing to our distance from them in space or time, we are unable ourselves to perceive.

Hence, according to this division, the kinds of human testimony must likewise be twofold, viz., Dogmatic and Historical.

Now, **Dogmatic Testimony** is evidently not the source of knowledge to which theoretic and practical propositions primarily and properly belong, for we have seen that they come to us through reason in one or other of its two forms. Hence human authority cannot *in itself* vouch for their certainty; and, as its worth is only proportioned to the value of the *grounds* upon which the teaching rests, no science can be established by its means. Thus, from a scientific point of view, its service is very subordinate indeed.

In another aspect, however, it not only has its

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uses, but is even necessary: for as an instructor it is an essential condition in that part of education which has the training of the mind for its end. A child takes his first teaching on the authority of his teacher, who says—for instance—that gold is malleable and ductile. He holds it on faith until he comes to know later on in life how the truth of his teacher's proposition can be proved; then, when he has tracked it to its causes, it becomes scientific knowledge. Our friend, common sense, tells us that this is the natural process followed in the development of human reason, and that thus all our strictly rational knowledge practically begins with faith. Again, all of us who are not scientists, and the average men and women of the world, who have neither the brains, nor the physique, nor the time to investigate facts, and put them together systematically when found, are very much in the position of children under a teacher, with this difference that our faith in the facts of science is not likely to blossom later on into scientific knowledge, as may the simpler facts put before children. Very few people indeed calculated the distance of the earth from the sun last time Venus gave us an opportunity of getting the sum right by journeying across his disc; but we all believe our teachers, the astronomers, when they give us the result of their computations. Reason itself inclines us to put faith in those best skilled in any art or science, according to the saying *Cuique in suâ arte credendum*, a text from the bible of common sense.

Widely different from the comparatively limited scope of dogmatic testimony is that of **historical**

testimony, which bridges over the distance that separates us either in space or time from facts of external experience, and so is the proper and only source from which we get to know them. Hence its value and necessity, for the sphere of even the most extended personal observation is very limited, and it is sometimes absolutely needful that we should know things of which, but for human testimony, we should always remain in ignorance. The three channels of historical testimony are **Tradition,** when the relation of facts is handed down orally from generation to generation; **Written documents,** when the story is transmitted by writing; **Monuments,** when it is represented by means of art.

The **trustworthiness** of human testimony depends primarily on the **credibility of the witnesses,** *i.e.*, on their knowledge of what they affirm, and on their veraciousness; and for these to be undoubted there must be the following **conditions:**

(*α.*) The **fact** related must have been in itself possible, and possible under the given circumstances, either naturally or supernaturally, and be of sufficient importance to arouse the attention of those who attest it, or to excite their interest and so induce them to investigate it.

(*β.*) The **witnesses** must either have themselves observed the facts asserted, or have had unquestionable means of information; they should usually be numerous, and differ from one another in character, interests, associations, views, and personal bias. In this case, their testimony cannot possibly concur unless it be true. If only few in number, they must all be of unimpeachable integrity, or else the facts

they relate must have been known to many of their contemporaries, by whom they are not contradicted either implicitly or explicitly. Lastly, they must not deliver their testimony in a party spirit, or write from a prejudiced point of view.

(γ.) Their **relations** of their common subject-matter must at least agree in substance, *i.e.*, there must be no diversity of statement as to essentials; diversity in regard to minor details there must always be, and often it serves to strengthen rather than weaken the main assertion.

By all these means we can assure ourselves of the credibility of the witnesses; but the trustworthiness of human testimony depends likewise on the **integrity** of their testimony, *i.e.*, whether it comes to us as it was actually delivered by them. This, in its turn, depends on certain given **conditions**, viz.

(α.) With respect to the matter of **Tradition**, it must have been something well known to and observed by many persons; the tradition itself should be full and unbroken.

(β.) **Historical documents** must be authentic, *i.e.*, written by the person to whom they are attributed. If this cannot be proved, they must at least belong to the age in which he lived; but a document of this latter kind, *i.e.*, a spurious contemporary, has in itself taken singly no authority, though it may serve to strengthen that of an authentic one. Then, documents must be genuine, *i.e.*, they must contain exactly what was written by their author, neither less nor more; which they will not do if they are corrupted by faulty copyists, or cut down or added to by an interpolator. It is the province of

historical criticism to examine and either to prove or disprove the authenticity and genuineness of alleged historical documents on grounds extrinsic and intrinsic, according to laws and rules which do not fall within the scope of Logic. Acquaintance with them cannot be better made than from Father de Smedt's *Introductio ad historiam ecclesiasticam* and *Principes de la critique historique.*

(γ.) **Monuments**, whether statues, pictures, inscriptions, buildings, etc., must be coeval with the deeds they attest, and in no way contradictory to trustworthy records and tradition.

If these two lists of conditions be observed, it is as clear as noon-day that we can have no reasonable doubt of the facts that we learn by means of historical testimony. Dogmatic testimony, which affirms truths of the reason, may not in itself—as we have seen—be sufficient to produce certainty; but common sense, the concurrence of many judgments, and the utter improbability of the contradictory (to say nothing of argument), in innumerable instances make it impossible to doubt truths which come to us solely through dogmatic testimony.

Thus it will be seen that the human faith, which holds society together in mutual trust and confidence, is based partly on dogmatic and partly on historical testimony, accordingly as it assents either to some truth of the reason or to some fact of experience; and so closely is it allied to common sense that it is often extremely difficult to discover which of them is practically our motive of certainty. For full and most able demonstration of the necessity of belief in daily life, see the lecture on *Belief a*

necessity, No 1. of the series on the *Spirit of Faith*, by Bishop Hedley, and St. Augustine's *De Utilitate credendi*, chapters 12 and 16.

(b.) **Divine Authority** is not of course to be reckoned among natural sources of knowledge, because Divine Revelation is supernatural, and its truths come to us in a supernatural way. Hence Christianity, in which we receive divinely revealed truths on Divine authority, is not natural but supernatural knowledge. Hence, it must be based, on the one hand, on a supernatural motive—the veracity of God Who reveals Himself; and, on the other hand, on the supernatural light which enlightens the human soul, and elicits its act of faith. Nevertheless, Divine Authority must not be entirely passed over in the enumeration of the sources of knowledge; for, in studying the "end of the act of the agent" we are really on the boundary line between Logic and Philosophy, and, as in studying Philosophy it is of the utmost importance that we should keep well before our minds its relation to Divine Revelation, we must know the leading principles that refer to Divine Authority as a source of knowledge.

The **truths** of which we become cognizant by means of Revelation are of two kinds, or rather belong to two classes of subjects, viz.:

(*a.*) Supra-rational truths, or—as they are called —mysteries, which as such transcend the natural comprehension of human reason, and can never be either discovered or demonstrated solely by its means, *e.g.*, the Trinity, the Beatific Vision after death, etc.

(β.) Truths which are *per se* truths of reason, and can be known and proved as such, *e.g.*, the wisdom and goodness of God, the Creation of the world, etc.

It is obvious to say that for the first of these two classes of truths Divine Revelation is an absolute necessity, if we are to know them at all; for such knowledge will not come through any other channel. Reason tells us, it is true, that God as the infinite and eternal Truth can and must contain within Himself truths unattainable by our limited human reason; but this clearly involves the corollary that, if we are to know such truths, Divine Revelation is absolutely necessary for our knowledge. For the second class, on the contrary, Revelation is not *absolutely* necessary, because the truths it comprehends could possibly be attained by unaided reason. Yet it is most certainly *morally* necessary; for their attainment by unaided reason is practically very difficult and in many cases as practically impossible. It demands much time and hard study; and, moreover, reason itself is in consequence of its natural narrowness and weakness liable to fall into error. Hence, if these truths were not in Revelation, they could only be known to few persons at the cost of protracted studious labour; and even then would be fragmentary; mixed up with error, and difficult to maintain; while to the mass of mankind they would be utterly unknown. If this is not to be, if the knowledge of these truths is to be offered at all, if they are to be free from any admixture of error, they must be directly revealed byGod Himself: therefore, as containing *them* in contradistinction to its other

supra-rational truths, Divine Revelation is at least morally necessary. For the full development of this point, see St. Thomas' *Contra Gent.* l. 1, c. 4.; and *Summa Theol.* p. 1, q. 1, art. 1; 2a 2æ, q. 2, art. 4. c., from which the passage just concluded has been taken in substance.

Of the **trustworthiness** of Divine Testimony, there is not of course, there cannot be the shadow of a doubt. If God vouchsafes to give us a Revelation, it follows as a matter of necessity that the truths revealed come from Him, and that He is the guarantee of their truth and the motive of their certainty because He Himself is absolute Truth Who cannot deceive or be deceived. Therefore we are bound to receive such truths unconditionally even when they transcend out rational powers. That they should intrinsically militate against reason, we have already shown to be an impossibility.[3] The duty of accepting Divine Revelation presupposes, however, two **conditions,** without which faith in revealed truths on Divine Testimony would be impossible. They are:

(*a.*) We must be quite sure that God *has* revealed Himself, *i.e.*, that there is a Divine Revelation. He, who offers us a Revelation from God, must unmistakeably prove his Divine mission, and in some way testify to the truth of what he offers as the Divine message. Such proofs usually consist of miracles and prophecy when a country first receives the Gospel tidings. In so far as the reason apprehends these or any other proofs which bring home to it the fact of Revelation, they become what are called motives of the credibility of Revelation.

3 P. 156.

(*β.*) The **integrity** of Revelation has to be proved, viz., that its matter is pure and unadulterated, and so neither distorted, mutilated, nor falsified; hence that there is a true interpretation of it for all persons and for all times. Now this can only be under one condition, viz., that it is confided to a single authority empowered to do all this for us. Hence, there must be a church established by God to be the depositary and guardian and interpreter of His Revelation, and for this end endowed with the prerogative of infallibility. Then the Church must be recognizable as such, *i.e.*, she must have such marks as will show her forth and prove her to be the true infallible Church established by God—*Ecclesia Dei.* And she has them. "She is *One*, she is *Holy*, she is *Catholic*, she is *Apostolic*." Proof of them would lead us beyond the domain of Logic; but it remains to be noted that, inasmuch as they are apprehended by the reason, they are to it the motives or means by which it recognizes and acknowledges the Church as true and her teaching as full and faithworthy.

The Sources of Knowledge as guarantees of Truth and motives of Certainty being Criteria of Truth *per quod*, lead up naturally to the consideration of the Criterion of Truth *secundum Quod.*

CHAPTER III.

V The criterion of Truth and principle of Certainty.
VI. Rules for attaining material truth of thought.

V. Criterion of Truth and **Principle of Certainty.** Though the sources of Knowledge are the channels of Truth and its guarantees, we cannot have passed them in review without freely owning that by themselves they are insufficient criteria of conceptual Truth. The senses one and all may be out of order, and their perceptions become in consequence occasions of intellectual error. Human reason and human authority are not infallible; and we all know by experience into how many errors they may be led by the influence of prejudice, of morbid imagination, of wrong teaching, and by the misdirection of a wayward or stubborn will. Beyond them then, we need a safer and more trustworthy measure, a criterion according to which—hence called *criterion secundum quod*—we may know whether the judgments we form in every sphere of truth (with one exception hereafter to be noted) are true or false. Hence the Criterion of Truth may be defined as, that according to which we distinguish the true from the false in our cognitions; or, the rule according to which the intellect *ought* to judge of all things.

The Sources of Knowledge give us the *grounds* for the truth of the cognition; by the Criterion of

Truth we should perceive whether these grounds make the truth of the given proposition perfect and certain, and therefore utterly exclude its contradictory. Hence, as finally producing certainty, the criterion of Truth is called the Cause or Principle of Certainty. It does not enter into the limits of the present work, to show why we cannot accept a criterion purely external, such as are proposed by Huet and Bautain, Lamennais, or Jacobi; or why the merely internal criterion as proposed by Descartes, Reid, or Kant is opposed to the teaching of scholastic philosophy; but it is necessary to remark at the outset that the subject of our present inquiry is not a simply *subjective* criterion, by which the individual intellect unfailingly assures itself of the truth of each and every one of its cognitions. To assert the existence of such a criterion would be to vindicate for the human race the gift of infallibility; and the logic of facts has as yet given us no reason for adding this article to our philosophical creed. But a criterion there is, mainly *objective*, the motive cause of all knowledge, the mother of science, the sole genuine fountain of true certainty; and this criterion, if it is to fit into its definition, viz., "the rule according to which the intellect *ought* to judge of all things," must be **Objective Evidence,** *i.e.*, the intelligibility of the thing; or—in more intelligible phraseology—the object of thought itself, which is, either mediately or immediately, so obviously presented to the understanding, that we necessarily judge the thing must be as it is, and cannot be other than it is. "Cannot be other than it is," is, however, a phrase

with at least two distinct shades of meaning. If the evident proposition is a necessary truth, the phrase of course is of universal application; if it is a contingent truth, the meaning is simply this, that it cannot in point of fact be otherwise in the given case and under the given circumstances.

Viewed with regard to the evident **truth**, Objective Evidence is of three kinds corresponding to the three kinds or degrees of certitude:

(*a.*) **Metaphysical**, *i.e.*, absolutely unconditioned; therefore eternal and unchanging; therefore absolutely excluding the possibility of its contradictory; therefore the property of truths which are supreme in the great hierarchy; therefore nearest to the throne of wisdom. Such, for instance, is the evidence for the great principle of contradiction—*the same thing cannot at the same time be and not be in the same relation.* It is so clearly intelligible that we cannot conceive the possibility of anything endangering its supremacy either in the past or in the future, in the actual, or the possible.

(*β.*) **Physical**, *i.e.*, conditioned by the Divine Will; therefore its contradictory is a physical impossibility. This evidence is biform in character: it either illumines a fact of nature as being a fact, *e.g.*, the magnet attracts iron, the ocean waters generally ebb and flow; or it illumines an event which is future, but which will take place according to the regular operations of nature, *e.g.*, there will be full moon on the 30th of this month, the thermometer will fall below 80° Fahrenheit next month.

(*γ.*) **Moral**, *i.e.*, conditioned by the human will; therefore its contradictory is only morally impos-

sible. This kind of evidence may likewise illumine things past or present, *e.g.*, St. Mary's Abbey, either a fact or the monastic home of Alcuin,—Paris is York, Capital of France; or things yet future, *e.g.*, the Pope will recover his temporal power. It is clear that, if Alcuin had been so minded, he might have done otherwise than accumulate his erudition as a monk of St. Mary's; that, if the men of the olden time had chosen differently, Paris might never have been built; and it is almost more clear that the assertion about the Pope recovering his temporal power depends for its verification on the free agency of many human wills.

With reference to its **intelligibility,** Evidence may be:

(*a.*) **intrinsic,** *i.e.*, when it is inherent in the proposition itself as an intrinsic truth, *e.g.*, the whole is greater than its part; here the intrinsic truth of the proposition is clear from simple comparison of the two concepts.

(*β.*) **extrinsic,** *i.e.*, when the proposition is evident, not intrinsically, but merely from the testimony to its truth of an extrinsic credible witness; such, for instance, as internal and external experience; *e.g.*, the proposition, "I exist," is evident from the testimony of self-consciousness. Truths, too, which come to us by way of authority, fall naturally into the category of propositions extrinsically evident. But we must make a distinction between the evidence of experience and the evidence of authority. Strictly speaking, this last does not make evident the thing testified, but the fact of our possessing intact the testimony of a witness, and the further fact of his

credibility: hence its name of evident credibility; *e.g.*, the conspiring evidence of human testimony tells me that William the Conqueror gained the battle of Hastings, that Cicero wrote *De Officiis*, that Xenophon wrote the *Anabasis*, and that there are vast prairies in America.

With regard to its **grounds** on the one hand, and on the other with regard to its **relation to the human intellect,** Evidence, again, is either

(*a.*) **immediate,** *i.e.*, when the intellect intues its truth, and hence has no need of argument; that is to say, the light of evidence shines out of itself on the mind of man, and compels assent. Such truths, to adopt the expression of Cardinal Pallavicino, "carry the testimony of their truth graven on their forehead," and comprise the immediately evident truths of the reason, *e.g.*, things which are double of the same are equal to one another, and the immediately evident truths of experience, *e.g.*, I exist, I think, there are solid bodies outside of me, &c. Hence we see that immediate evidence may be either intrinsic or extrinsic. By it are illuminated the great first principles, the fundamental truths which have been called the "buttresses of the temple of wisdom," and which, we have seen, serve as a *point de départ* for demonstration.

(*β.*) **mediate,** *i.e.*, when the evidence is made apparent either by induction or deduction. Truths only mediately evident are not at once evident in themselves, but their evidence is germinally included in other truths which are, *hic et nunc*, immediately evident to the intellect which has formed its judgment concerning them. Reasoning, we know,

developes implicit germinal evidence into explicit life; and so, with its object thus illuminated by the evolution of the light of evidence hitherto latent, the intellect assents. To what? To the conclusion of a syllogism either perfect or cryptical.

Though **Evidence** is primarily and **in itself objective**, yet **in a subsidiary sense** it has a **subjective** meaning; just as certainty, which is primarily subjective, is in a secondary sense objective. When an object shining with the light of intelligibility presents itself before the intellect, and awakens it to an act of adhesion, to an assent, or judgment, the concept or judgment is irradiated—so to say—with the shining brightness of the object, and is said to be itself evident. Hence the application of the term in common parlance, but it is at best only analogical.

While it is quite true to call the Criterion of Truth the Principle of Certainty, we must not infer, nay, we cannot infer that Objective Evidence is what *actually*, in the generality of cases, induces the intellect to assent, and determines it to pronounce a judgment. This is done by what is called the **formal object of certainty**, because it is *practically* the motive which determines the intellect to judge. It must not be confounded with the *material* object of certainty which, we have said or implied elsewhere, is the thing we know, or are certain about. Now, the motive which induces the intellect to pronounce its judgment differs in several respects from Objective Evidence, and so has no right to be taken for it, and called the Criterion of Truth, because: the inducing motive is something individual; it gives

the reasons why, *hic et nunc*, I judge this or that to be the case; it is subjective to *me;* it varies according to my nature, my interests, my preconceived notions; it may be perverted by my will, or by ignorance. Objective Evidence, on the contrary, is something apart from the individual; it gives the reasons why I *ought* to judge this or that to be the case; it is independent of all that affects the individual; it is something outside of me, though attainable by me. The one regards each special man; the other, a normal man such as he would be if he were perfect and not subject to error. The one gives me what satisfies my mind; the other, what satisfies the requirements of truth. In the *ideal* man the two would coincide; but we are unfortunately fallible, and are quite certain about a thousand things that are false—quite certain be it repeated, for subjective certainty in its wide meaning consists in the adhesion of the mind to its judgments without fear of error, and those judgments may be either true or false. Dr. Döllinger, for instance, professed himself quite certain that the dogma of Papal Infallibility was a modern invention got up at the Vatican Council. There was something which induced his intellect so to judge. What? His early prejudices, individual training, misinterpretation of facts, and possibly the love of being the head of a party. And so there is something which induces certain members of several modern governments to judge that children's brains should be worked at high pressure; Mr. Bradlaugh, that the common sense of mankind has gone astray in accepting as a truth the existence of God; Ingersoll, that mysteries

and Revelation *in toto* are an irrational myth. Yet the Objective Evidence of what all these people hold is *nil*. Hence, when we say that Objective Evidence is the universal rule of our judgments, we mean that it is the rule which *ought* to govern our judgments, not the rule which *does* as a matter of fact govern them from first to last.

That no false proposition can be really evident, is a necessary consequence of Evidence being the criterion of truth; how comes it then that the formal object of certainty induces me and the rest of fallible mortals to adhere tenaciously to false judgments on occasions? The answer gives the very ground of obstinate error, which is that we consider a proposition true and certain, which is not and cannot be evident. We do so, because we either lack the means to attain an evident cognition of the truth, and hold to, what under the circumstances, *appears* to be true, though it is not so actually, and then our error is what is called invincible; or our wills are perverted, and we stop short in our investigation of truth and our endeavours for its evident cognition, or else we voluntarily close our eyes to the light and cling to our false judgment in spite of our inability to deny the evidence for its contradictory; and then our error is known as vincible. But the fact of our having no evidence for it does not prevent us from thinking that we have. Indeed in most cases of error, probably, we are under the impression that there is adducible evidence for the false proposition to which we cling; we do not meet every day, though we do meet on some days, with certain creatures possibly

human who practically hold their *ipse dixit* to be the one criterion *per quod* and *secundum quod* they and the whole world ought to judge of all things. It is most common, on the contrary, for another set of dealers in positive assertions to support a false judgment on the plea that "it is evident." Evident, no doubt, they think it, either from their insufficient examination of the matter, or from their unwillingness to look at the subject in any other light than that of prejudice; but evident in *fact* it is not.

All that has been said of Objective Evidence as the Criterion of Truth refers, of course, to our judgments in the natural order, which do not include assent to the truths of Revelation. *They*, clearly enough, do not fall within the sphere of the Criterion of Truth which is Objective Evidence. Their criterion is Revelation itself; and, in the case of those truths of which we might have a fragmentary, unsatisfactory knowledge by means of human reason, but which are clearly and distinctly made known to us by Revelation, it is evident that Revelation is a much surer test than their Objective Evidence which is practically next to impossible to get at. Such truths are mainly religious and ethical. Hence the sphere of Evidence as the Criterion of Truth is limited to natural truths; but the sphere of Revelation as a Criterion is not absolutely limited to truths supernatural. Moreover, for purely natural truths Revelation is a kind of negative Criterion, for what is *actually* in contradiction to Revelation connot possibly be true; and so, when such propositions are met with, they may at once be rejected as false. The reason is that supra-rational can

never be at variance with rational truths;[1] *apparent* contradictions there may certainly be; but the more fully the light of reason is shed upon them, the more rapidly the misleading appearance melts away. One word of caution: a negative criterion is not a positive criterion, be it remembered; and it would be absurd to say that because some merely natural judgment does not contradict Revelation, therefore it is true.

But although the mysteries of our Christian faith and in general all Truths of Revelation are not intrinsically evident, they are nevertheless extrinsically evident, or rather evidently credible. For it is perfectly certain that Divine Authority is credible, because God is Truth itself—"the very Truth Who cannot deceive or be deceived;" and it can be proved to demonstration that He has really revealed Himself to us, and that the Church—Christ's Changeless Bride without spot or wrinkle—is the infallible depositary and interpreter of Revelation; and this we have already seen to be evident credibility;[2] hence the truths of Revelation are extrinsically evident in the secondary sense of the word (q. v.), or evidently credible. Now *because* they are only evidently credible, the assent of Faith is and always will be a *free act*, which it is possible to withhold. Intrinsic evidence *constrains* the intellect to judge one way or another when it happens to coincide with the formal object of certainty; when it does not coincide with the power which induces

[1] See St. Thomas, *Contra. Gent.* l. 1, c. 7.; In l. Boeth. *De Trin.* q. 2, art. 3.

[2] See St. Thomas, in lib. *Sent.* 3, dist. 24.

assent, it has no influence whatever on the judgment or next to none. But, with regard to truths that are only evidently credible to it, the intellect is only *under the necessity* of accepting them in so far as it has no rational ground upon which to base assent to their denial. This necessity is indirect rather than direct, and so is in no sense unconditioned; for it really is the will which determines the intellect to assent to and accept revealed Truth. Hence, though Faith is certainly an intellectual act, it is so only inasmuch as the intellect is determined by the will to assent; and hence too is Faith a free act.[3]

If the question of Certitude and Conceptual Truth has been treated more fully than may at first sight appear consistent with the plan of the present volume, the reason must be sought for in the importance of the subject. Its relation to philosophy is not only initial but fundamental. More than this, to use the words of "Balmez," in this foundation of the scientific edifice, if examined with attention, you will see the whole edifice traced out. It is a plane on which are projected in a very visible manner, and in beauteous perspective, the whole solid structure which it has to support.[4]

From what has been advanced, finally, we are now in a position to draw definite conclusions, based on motives "just, useful, and necessary, delightful and easy," and applicable to every mind which, at the threshold of knowledge, asks itself—"what must I do, and what must I avoid, if, in the labyrinthine windings on the vast tracks opening before me, I

3 See *Summa Theol.* 2a. 2æ, q. 1, art. 4.
4 *Filosofia fundamental*, c. 1, n. 2.

am to attain Truth and true Certainty?" These conclusions are the

VI. Laws on which depends the Material Truth of Thought, or the rules we must observe if we would ensure the material truth of our cognitions. Of these laws the three principal are of a **theoretic or speculative** character, and so form a class distinct from those that may, by way of distinction, be called **practical.**

The laws of the first or **speculative** class are:

(1.) To assure ourselves of the material truth of a proposition, it must, if not immediately evident, be proved, and proved in such a manner that the grounds of its truth are drawn from the source of knowledge to whose sphere it belongs.

(2.) A proposition must only be accepted as true when it has, by means of these grounds, become objectively evident; for, from a strictly logical point of view, a proposition that is not objectively evident cannot be received as true.

(3.) If a proposition is not to be accepted as true unless it is objectively evident, so—on the other hand—when an evident proposition has been received as true and certain, it cannot logically be matter for further doubt, though we may have occasion to restrict our acceptance of it within certain limits.

As a foil to the sweeping character of these three rules—which obviously do not apply very closely to the ordinary run of practical life—it may be noted that, in order to prevent the danger of our ascribing objective evidence to a proposition which has none, particularly in the higher order of truths that border upon or even pass into the supernatural, it is well to

ascertain that the proposition in question is not in contradiction with Revelation.

The laws of the second or **practical** class are;

(1.) To lay aside preconceived notions or prejudices, which are a veritable and prolific source of error. The way to do this, is to examine them dispassionately and critically, sitting in honest stern judgment over our own selves, and not to shrink from throwing overboard our prepossessions and foregone conclusions if they prove to be false. Prejudices are of many kinds, and arise from many causes; but this is not the place for their examination.

(2.) Not to be guided in our thoughts and inquiries by mere feeling, nor to allow ourselves to be under the dominion of any passion; for by unsubdued passions and unruly inclinations the will is perverted; and most errors are caused by a perverted will, which leads the understanding into false ways, and compels its assent to what is false by blinding its sight to the light of truth. So, if we would seek truth *to find it*, we must keep ourselves free from passion, and prosecute our search with a sincere and earnest good will.

(3.) To avoid one-sidedness and narrowness in our studies. It often happens that when study is confined to one sphere of truth, or to a single science, other truths and sciences are in consequence undervalued, and this frequently leads to a denial of their truth. We cannot see what lies beyond our little circle; and, because we cannot see it, we will not admit its truth. Such one-sidedness is, to say the least, a sign of eccentricity and conceit,

and always make a man ridiculous. But it is a malady of other departments of thought as well as of what is technically called study; and everywhere it is an enemy to the attainment of truth. Like the people under the dominion of prejudice or of perverted will, narrow-minded folk shut the door—so to say—in the face of truth; and among them are usually to be found believers in the myth of personal infallibility, and certain self-constituted judges in Israel, whose judgments of their fellows lack faith in good intentions, and charity of interpretation.

(4.) Not to lay aside—in practice at all events—the study of Logic. To do so would be to lay ourselves open to the danger of accepting unproved assertions for proved propositions, taking ridiculous fallacies for legitimate arguments, and utterly misconceiving the matter in hand. This does not mean that we are never to lay aside the study of the technicalities of Logic; nor that dexterity in the application of what may be called the framework of merely Formal Logic constitutes a good reasoner, any more than an abiding sense of the dry rules of grammar constitutes a good writer; but it does mean that we should never fail to apply the rules of Logic, mainly the rules of Method and Material Logic, to cases that demand accuracy and exact thought. This is not done by certain young scribblers of both sexes, for instance, who occasionally undertake to publish papers on subjects of which they do not fully know the meaning and scope; hence cannot divide into natural parts, or support by congruous arguments; while they seek to cover their ignorance or mental slovenliness by

rhetorical figures, poetic phraseology, light-heeled comparisons, etc., to the mental detriment of readers who have not sufficient critical acumen to reject the gilded bauble.

(5.) Not to shirk the labour of thought; we often consider a proposition true, and deem it unnecessary to trouble ourselves further about its proof, when, if we looked at it more closely, we should see that it was by no means evident. Resulting from a form of mental indolence, which may be described as habitual passivity of thought, this habit of taking in ready-made views, and submitting without effort to the ideas set before it, is in its very nature inimical to the earnest search after truth, which is ever on the alert to examine, discriminate, compare, pursue, and judge for itself. Not inconsistently, minds that are strangers to the patient labour of studious thought, and like to be fed as children are fed, are not unfrequently smitten with the plague of "viewiness." And this from the very nature of the case. Because they do not take the trouble to think a thought right through for themselves; because they have little, if any care to discriminate the true from the false in the omniscient utterances of periodical literature, they are able, at a moment's notice, to retail from these questionable sources of knowledge views on all subjects from pre-historic man to the cause of the latest abnormal sun-spot, from the utility or non-utility of philosophy to the last speculation of Barnum. Do these viewy dogmatisers minister to the interests of Truth?

(6.) To observe a determined order and method in study. If we study in a confused mixumgatherum

sort of fashion, our brains will be "all abroad" in a hopeless haze, where—if we may trust the teachings of experience—false impressions and errors of all kinds grow into convictions without restraint. Order in study both presupposes and strengthens some kind of general order in reading, and so preserves the mind from the enervating habit of dipping into multitudinous books without aim or purpose,—a habit not to be named in the same breath, though unfortunately sometimes confounded by the thoughtless with a direct minister to truth, viz., Catholicity of taste in literature.

(7.) Not to allow the imagination too much play. Unless this naturally unruly faculty be kept well in hand under the discipline of reason, it will lead us into all manner of blunders; for it has the unfortunate propensity to bring before the intellect, and often determine it to regard as true, things exaggerated and distorted out of all resemblance to their supposed original in the sober land of facts. Quite as necessary is honest self-judgment in restraining the vagaries of the imagination, as in dismantling the mind of prejudices.

(8.) Not to allow ourselves to be deceived, on the one hand, by mere words and phrases; or to be led astray, on the other hand, by excellence of style. Empty verbosity is one of the literary plagues of the day, and newspapers and periodicals of all classes save the highest, are largely infected by it. When an objection cannot be answered, when an argument cannot be met, when an assertion is not quite to an opponent's taste, and in many other like cases, a brilliant saying, a witty repartee, a party

watch-word, declamatory abuse, sometimes even grandiose twaddle suffices to lay waste the interests of truth, and override its supporters. A like effect may be and often is produced by the influence of a good style; for a reader may be so captivated by the graces of elegant diction and the beauty of its ornaments, as to overlook the inaccuracy of the facts and arguments, and so be led to yield his assent to error. Hence the necessity of judging of things in their real nature and just relation to one another apart from the use of language; and this will be secured by confronting high-sounding, clever, positive, or wordy phrases, or by divesting ourselves of the prejudice in his favour with which an author's style may have inspired us, as the case may be, in order to get to know the exact meaning of the assertions claiming assent, and then to test them by proof. The result of such an examination shows but too often that they are all but meaningless, or else the mask of error.

When we consider how important it is, with respect both to our temporal and eternal interests, to be sure of the truth of our knowledge, and how momentous are the consequences of error both to individuals and to mankind in general; we cannot fail to acknowledge ourselves obliged to strive to secure mental accuracy, and hence to observe the rules laid down by Logic for this end in the interests of Truth.

As a set-off to all this dogmatism, however, it must be remarked that the rules enumerated, and all the strong things said about accuracy apply to the earnest investigation of Truth, which in some

one of its many forms enters into the duty of nearly every life. But there is no intention whatever of depreciating the mental pleasures, which may not lie strictly within duty's range, and yet be necessary for the mind's relaxation. It is the tendency of some hard students to think that "all work and no play" does *not* make "Jack a dull boy." But this is generally a mistake, proved to be such by the inexorable logic of facts. And so, after pouring out the vials of wrath upon desultory reading and study, the illogical productions of certain budding scribblers, the kaleidoscopic pictures of the imagination, and the brilliant sayings and excellence of style, which are not always enlisted in the service of truth; it is only fair to add that—considered *in themselves*—all these things are very far from useless. When the mind is out for its holiday, when it is weary and unfit for hard work, they help to restore its tone, and—by preparing it to resume its study of Truth with renewed vigour—are, like many other things not calling for mention here, indirectly ministering to its acquirement. But—do not let us mistake them for the direct road to it; or our certainties will not be the certainties of truth, the certainties of which St. Thomas says: "Certitudo, quæ est in scientia et in intellectu, est ex *ipsa evidentia* eorum quæ certa esse dicuntur."

QUESTIONS.

I. 1. Name any two of the six definitions of Logic.

2. Contrast one full definition with one that applies only to Formal Logic.

3. What is the purpose of Logic?

II. 1. What must there be in order to answer this purpose?

2. How does this tell upon the division of Logic?

3. Distinguish (a.) Material and Formal, (b.) Natural and Artificial Logic, and show by some comparisons the relation between Artificial and Natural Logic.

III. 1. Prove the necessity of Logic, and give an authority for this proof.

A.

I. 1. Why is man called a rational animal?

2. Why do we say that the soul "informs" the body?

3. What sort of a substance is the soul? Can it act independently of the body?

II. 1. Distinguish the three classes of human powers.

2. In virtue of what connection does each class belong to the soul?

III. 1. What are the three powers of the intellect or understanding?

2. What is the function of each?

IV. 1. What do we understand by the term, "action of the intellect?"

2. Explain how ideas are formed, and then clearly distinguish the **sensus intimus** and the **species intelligibilis.**

3. What is the process of putting together two ideas called?

Give (a.) a positive, (b.) a negative illustration from any of the following ideas: **history, art, Euclid, instructive, interesting, puzzling, sky, water, mountains, green, blue, cloudy, misty.**

4. Explain the process of reasoning, and illustrate it by two original examples.

5. What is the difference between speculative and practical reasoning?

6. Are the following examples speculative or practical:

(a.) Any one who would work that sum correctly, must have a knowledge of decimal fractions;
But I would work that sum correctly;
Therefore I must have a knowledge of decimal fractions.

(b.) All stars shine;
Sirius is a star;
Therefore Sirius shines.

(c.) A piece of furniture is held together by the forces of adhesion and cohesion;
But my desk is a piece of furniture;
Therefore my desk is held together by the force of adhesion and cohesion.

7. What is the end of reasoning? What is meant by the Logical or Rational Order?

B.

II. 1. In what relation do terms and propositions stand to Formal Logic?

2. What is the relation of reasoning to Formal Logic?

III. 1. Of what are terms and propositions the respective signs?

IV. 1. Define **term** (a.) taken absolutely, (b.) in relation to propositions.

2. Name the terms in the following:

Time flies;

"True, 'tis pity; pity 'tis, 'tis true;"

"His life was gentle;"

"This was a man."

V. 1. Distinguish (a.) simple and complex, (b.) absolute and relative, (c.) abstract and concrete terms.

2. To what classes does each of the terms in the following sentences belong:

"This is not my writing,
Though, I confess, much like the character."

"Slips of yew
Silver'd in the moon's eclipse."

Mothers love their children.

Duty before pleasure.

3. Why are genus, species, difference, property, and accident, called universals? Define, and give an example of each.

4. Name some universal and some equivocal terms, and say why they are so?

5. In what senses is the word analogy used? Which is the more usual meaning?

VI. 1. Why is a proposition called an "interpretation?" What do propositions unite or separate?

2. What is the "form" of every proposition?

3. Resolve three original propositions into subject, nexus, and predicate.

VII. 1. How would you recognize a categorical, causal, hypothetical, disjunctive proposition?

2. Pick out of the following list of propositions those which are (a.) universal; then, in succession, those which are (b.) particular, (c.) negative, (d.) hypothetical, (e.) disjunctive:

If the barometer rises, it will not rain. Water seeks its own level.

Most farmers are confirmed grumblers.

The most convenient books are octavos or duodecimos.

If we examine our own cognitional powers, we shall be able to get a clear idea, though not of course perfect knowledge, of the impassable abyss that separates us from all the lower animals.

Light cannot reach us from Sirius in less than fifteen or twenty years. Sirius is either a white, or yellow, or red, or blue, or purple, or green star.

Antares is a red star with a greenish scintillation.

If orbits of suns, like orbits of planets, are ellipses, our sun will curve away sideways long before he reaches the constellation Hercules.

"One touch of nature makes the whole world kin."

"If it were done, when 'tis done, then 'twere well
It were done quickly."

Every free and independent nation may claim the right to a native literature.

Supposings have to give in to facts.

No milkmaids like smoky slums.

If Telemachos dismisses his mother from his home, her Erinuës will come upon him.

3. Examine any five propositions in the foregoing list, and point out the subject, copula and predicate in each.

VIII. 1. In how many ways may propositions be equivalent?

2. Prove by examples that a true equivalence is to be found in each of these ways.

3. Find an equivalent of each kind for the following propositions:

"All our yesterdays have lighted fools the way to dusty death."

"All occasions do inform against me."

Every reader must be struck by the recurrence of the Phœnician name.

"All the tree-tops lay asleep,
Like green waves on the sea."

"He prayeth best who loveth best."

"This seraph-band, each waved his hand."

4. Opposition is the contrast or diversity existing between certain propositions; examine the following pairs, and state why opposition may be found in some, and why not in others:

(a.) All astronomers call Antares "the Sirius of Red Suns;" some astronomers do not call Antares the "Sirius of Red Suns."

(b.) Vega, Altair and Regulus shine with a brilliant white light; Aldebaran and Pollux are ruby red.

(c.) All rules have exceptions;

No rules have exceptions.

(d.) Some astronomers are perplexed.

Some astronomers are not perplexed.

(e.) All Jupiter's four moons travel round him at different distances;

The sun and the planets do not travel round the earth.

5. Re-examine the pairs of propositions, in which opposition exists; and say what is the kind of opposition in each.

6. What is the difference between contradictory and subaltern, contrary and sub-contrary opposition? Exemplify your explanation in each of the following propositions:

All men learn the rudiments of knowledge upon faith.

"All literatures are one; they are the voice of the natural man."

Many men are men of one idea.

Everything unsymmetrical was intolerable to Goethe.

Every star is in motion, hurrying along in space. Some move faster; some move slowly.

7. Why cannot (a.) two contradictory, (b.) two contrary propositions, both be true at once? Can (a.) two contradictories, (b.) two contraries both together be false?

8. May (a.) two sub-contraries, (b.) two subalterns both together be true? Prove your answer by an example of each.

2. Two sub-contraries cannot both together be false; why not?

Illustrate what you have said by an example.

10. May the truth of the subalternant proposition be inferred from the truth of the subalternate? If so, why? If not, why not?

May we infer the truth of the subalternate from the truth of the subalternant? Why; or why not?

Can we from the falseness of either subalternant or subalternate infer the falseness of the opposite proposition?

11. Distinguish the propositions called convertend and converse; and explain the two kinds of conversion.

12. Convert the propositions.

Honesty is the best policy.

Algol is not Arcturus.

Some stars are variable.

The "Prentice's pillar" is in Roslin Chapel.

All dictionaries are books.

13. "All gold is ductile." What can I infer from this proposition about things which are not ductile? What do I learn about things which are not gold?

14. Does a true convertend ever give a false converse? Does it ever give a true one?

Does a false convertend always give a false converse? Give an example.

15. How far can we infer truth or falseness, in

conversion of propositions, from the truth or falseness of convertend and converse?

16. From the following examples, show how the conversion of propositions leads from the Matter of Formal Logic to its Form:

The length of Westminster Abbey is five hundred and five feet.

The G.C.M. of 160903 and 66429=1. $9 \times 2 = 18$.

All flowers are beautiful.

All planets shine by reflected light.

IX. 1. What is the Form of the "act of the agent?" How is it treated of?

IX. 1. Examine the three definitions of a syllogism; then state how each one is exemplified in the following:

A rigidly disciplined mind never forgets that in physical science our data are very small considering the huge system of things they have to account for;

But Onesimus has a rigidly disciplined mind;

Therefore Onesimus never forgets that in physical science our data are very small considering the huge system of things they have to account for.

2. A very heavy man on earth would be a most light and active individual on Mars;

James is a very heavy man on earth;

Therefore James would be a most light and active individual on Mars.

Examine the above syllogism; then answer these questions:

(a.) Which is the middle term?

(b.) How do you know it to be the middle term?

(c.) Which is the major term? Why?

(d.) Which is the minor term? Why?

(e.) Which is the conclusion?

(f.) How do you know it to be the conclusion?

(g.) What are the two other propositions called? Why?

(h.) What is the name of the proposition containing the major term?

(i.) Distinguish extension and intension; and illustrate the distinction by circles.

3. Examine the following syllogism; then answer the same questions:

All dogs are animals;

Pilot is a dog;

Therefore Pilot is an animal.

4. What is the difference between the material and formal truth of a syllogism? Are they necessarily united? What is meant by a conclusion being true *per accidens?*

5. "It is impossible to deduce error from truth." Show how this axiom applies to the syllogism.

6. Do the following examples prove anything you have stated about the material and formal truth of the syllogism? If so, what?

(a.) Every planet is a heavenly body;

But my spinning-top is not a planet;

Therefore my spinning-top is not a heavenly body.

(b.) All poetry is elevating;

But the "Dream of Gerontius" is poetry;

Therefore the "Dream of Gerontius" is elevating.

(c.) Every man is a musician;

But Cornelius is a man;

Therefore Cornelius is a musician.

(d.) All ships are water-craft;
But the *Bellerophon* is a ship;
Therefore the *Bellerophon* is water-craft.

XI. 1. What is the main rule concerning the Matter of syllogisms?

2. On what two principles or canons do the right rules for the Form of the Syllogism rest?

3. How many terms are there in a syllogism? Why cannot there be more?

4. How many propositions must there be in a syllogism? Why not more?

5. Why should no term have greater extension in the conclusion than in the premisses?

6. What is meant by the middle term of a syllogism being distributed?

7. When and why must the middle term be distributed?

8. In which proposition must the middle term not appear? Why not?

9. Why is no conclusion obtainable when both premisses are negative?

10. What is the rule about two particular premisses? Give two reasons for this rule.

11. Why cannot a negative conclusion be drawn from two affirmative premisses?

12. If one premiss be negative, what do you know about the conclusion? Why?

13. If one premiss be particular, what can you infer about the conclusion? Why?

14. What is understood by the figures and modes of the syllogism?

15. Explain how the middle term is not distributed in the following false argument:

The nature of a clock is to indicate the correct time;

To deviate from the correct time is the nature of a clock;

Therefore to deviate from the correct time is to indicate the correct time.

16. What rules of the syllogism are broken by the following false arguments:

(a.) Some planet has a system of rings and satellites;

But Mercury is some planet;

Therefore Mercury has a system of rings and satellites.

(b.) The rose is a flower;

But the lily too is a flower;

Therefore the rose is the lily.

(c.) The study of modern languages is very useful;

But the study of philosophy is not the study of modern languages;

Therefore the study of philosophy is not very useful.

(d.) Some children are studious;

But some boys of seven are not studious;

Therefore some boys of seven are not children.

(e.) Constantine was probably born at York;

Constantine was a Roman Emperor;

Therefore all Roman Emperors were probably born at York.

(f.) Some astronomical terms are derived from the Arabic;

But equinoctial and amplitude are some astronomical terms;

Therefore equinoctial and amplitude are derived from the Arabic.

(g.) Some things attained without labour are valuable;

Some knowledge is attained without labour;

Therefore some knowledge is valuable.

(h.) No brutes are immortal;

No man is a brute;

Therefore no man is immortal.

XII. 1. Distinguish simple and compound syllogisms.

2. Why are the propositions forming categorical syllogisms called "propositions de inesse"?

3. From the following examples show how the first canon, which serves as a basis, for the rules of the syllogism, applies immediately to the categorical syllogism:

(a.) All Zulus are men;

But Cetywayo was a Zulu;

Therefore Cetywayo was a man.

(b.) No Saxon is a Hindoo;

But Witikind was a Saxon;

Therefore Witikind was not a Hindoo.

4. Explain how the *Dictum de omni, dictum de nullo*, is immediately resolvable into the principle of contradiction; and in your explanation introduce two original examples.

5. What are the parts of a hypothetical proposition? Upon what does its truth depend?

6. What is the relation between the middle and major terms in the major premiss of a hypothetical syllogism?

7. Upon what principle is the conditional form of the hypothetical syllogism based? Why?

8. Name the rules of the hypothetical syllogism. What results from these rules?

9. The terms of the rules may not be reversed: why not?

10. Show how the following arguments break these rules:

(a.) If he is guilty, he will like to hide himself;
But he does like to hide himself;
Therefore he is guilty.

(b.) If he is guilty, he will blush;
But he is not guilty;
Therefore he will not blush.

11. How does the first of the above arguments break the third rule of the ordinary syllogism; and the second, the second rule?

12. If the gardener has cut the flowers, I can fill the vases at once;
But the gardener has cut the flowers;
Therefore I can fill the vases at once.

Make the above argument into a categorical syllogism.

13. How do you recognize a copulative or conjunctive syllogism? Give an example of one.

14. What results from affirmation in the minor premiss of a conjunctive syllogism? For what reason?

15. Why cannot the terms of the second rule of the conjunctive syllogism be reversed? Prove what you say by an example.

16. Upon what principle is the form of the conjunctive and of the disjunctive syllogism based?

Explain this principle, and show how it is the basis of these forms.

17. Correct, or defend the following:

(a.) No one can at the same time study Greek and play cricket;

But Templeton is not studying Greek;

Therefore he is playing cricket.

(b.) Thetis could not be in the sea-palace with her thirty-three sisters and at the same time go to Olympus to procure arms for Achilles;

But she did go to Olympus to procure arms for Achilles;

Therefore she could not be in the sea-palace with her thirty-three sisters.

(c.) A triangle cannot be at once right-angled, obtuse-angled, and acute-angled;

But this triangle is acute-angled;

Therefore it can be neither right nor obtuse-angled.

(d.) No colour can be at once blue and yellow;

But this colour is not blue;

Therefore it is yellow.

18. What is the difference between the conjunctive and disjunctive syllogism?

19. What is the relation between the major and middle term in the major premiss of the disjunctive syllogism? Illustrate what you say by two examples.

20. Name the chief rule of the disjunctive syllogism, and state the necessary conditions implied in that rule.

21. Distinguish between the application of the rule to syllogisms in which the disjunctive major

has only two members, and to syllogisms in which the disjunctive major has more than two members.

22. When may the terms of the rule be reversed? When not? Why not?

23. Correct or defend the following, showing where they do, or do not obey the rule and conditions of the disjunctive syllogism:

(a.) A crime, as recognized by law, is either treason, or felony, or misdemeanour;

But forgery is neither treason nor misdemeanour;

Therefore it is felony.

(b.) A delta may be either a lake delta, an inland sea delta, or an ocean delta;

But the delta of the Nile is an inland sea delta;

Therefore it is neither a lake delta, nor an ocean delta.

(c.) Flowers are valued either for their beauty or for their scent;

The lily of the valley is valued for its scent;

Therefore it is not valued for its beauty.

(d.) Melodies are either in a major or minor key;

This melody is not in a minor;

Therefore it is in a major key.

(e.) Non-electors at parliamentary elections are either aliens, or persons convicted of forgery in a court of law, or juniors, or commissioners of stamps, or their employés, or employés in the General Post Office, or police constables, or persons in some other way disqualified;

But Pericles von Thränenberg and Honoré Guizot are employés in the General Post Office;

Therefore they are neither aliens, nor convicted of forgery in a court of law, nor juniors, &c.

(f.) Sirius is either a white, or a red, or a yellow, or a blue, or a purple star;

But Sirius is a yellow star;

Therefore neither red, nor yellow, nor blue, nor purple.

24. What is the general rule for testing the validity of compound syllogisms? Give the reason for the rule, and show by examples how it applies to each kind of compound syllogism.

XIII. 1. Distinguish (a.) Incomplete and (b.) Extended syllogisms; and say why they are sometimes called "forms of argument akin to the syllogism."

2. What kind of syllogisms are the following? Expand each into a formal syllogism.

(a.) Mars is a planet because it moves round the sun.

(b.) It is freezing hard, therefore we shall go out skating.

(c.) Ralph gets on well with his lessons because he is clever and studies hard.

(d.) There will probably be rain this afternoon because the clouds are low and heavy, and the wind is veering to the south.

(e.) I have not written my Latin exercise, therefore I shall get a bad mark.

(f.) Frank has broken his arm, so he cannot attend the gymnastic class this morning.

3. Reduce the following syllogisms to the form either of enthymemes or of contracted syllogisms:

(a.) Nothing that has extension is indivisible;
But everything that has length has extension;
Therefore nothing that has length is indivisible.
(b.) No simple essence is mutable in its nature;
But some substance is mutable in its nature;
Therefore some substance is not simple essence.
(c.) All metals are minerals;
But all metals are bodies;
Therefore some bodies are minerals.
(d.) His father lived in Keswick;
But he lived with his father;
Therefore he lived in Keswick.
(e.) All matter is divisible;
But that which is divisible is finite;
Therefore matter is finite.

4. What is a polysyllogism? An epichirema? A sorites? A dilemma?

5. Distinguish between a "pure" and a "mixed" polysyllogism. Why is the syllogistic series, to which a polysyllogism is reducible, sometimes called a "perfect polysyllogism"? When is the polysyllogism generally employed?

6. Resolve the following epichirema, which is employed by Cicero, into its component syllogisms; and say whether you consider it a conclusive argument:

If a man can be suspected of parricide, he must be otherwise most wicked, because it is a fearful crime;
But Sextus Roscius is not most wicked, because he is neither audacious, nor luxurious, nor avaricious;
Therefore he cannot be suspected of parricide.

In what circumstances is the epichirema often used?

7. On what does the formal truth of the sorites depend? Convert any polysyllogism into a sorites. In what do these two forms of argument differ?

8. Why is the dilemma called a "horned syllogism" and the "deadly weapon of argument"? What rules must be observed in every good dilemma? In what way is the strength or weakness of a dilemma proved?

9. Examine each of the following extended syllogisms; name the kind of each; then resolve it into simple syllogisms:

(a.) If schools are without Christianity, education will be without Christianity;

If education is without Christianity, the people will be reared without Christianity;

If the people are reared without Christianity, they will become un-Christian;

If the people become un-Christian, they will become anti-Christian;

Therefore, if schools are without Christianity, the people will become anti-Christian.

(b.) Practice produces dexterity;

Dexterity works confidence;

Confidence banishes undue bashfulness and timidity;

The absence of undue bashfulness and timidity ensures self-possession;

Self-possession secures the full command of personal oratorical resources;

The full command of personal oratorical resources is the measure of attainable oratorical success;

Hence practice is the measure of attainable oratorical success.

(c.) The moon is a satellite;

But every satellite is a planet;

Therefore the moon is a planet;

Planets shine by reflected light;

Therefore the moon shines by reflected light;

That which shines by reflected light is not self-luminous;

Therefore the moon is not self-luminous.

(d.) Doubt is an act of intelligence, for only an intelligent agent can doubt;

But doubt cannot doubt the intelligence that doubts, since to doubt that would be to doubt itself;

Therefore universal doubt is an impossibility.

(e.) This prisoner's challenge to the jury is unavailing, because

It is either a challenge peremptory, or a challenge *per causam;*

If it is a challenge peremptory, it is unavailing, for he is charged with misdemeanour, and in cases of misdemeanour, there is no peremptory challenge;

If it is a challenge *per causam;* it is unavailing, for no reason can be given for the objection;

Therefore, whether peremptory or *per causam,* still the challenge is unavailing.

(f.) Whatever is, in any sense, is either necessary and eternal, or contingent and created;

If you say it is necessary and eternal, you say it is God, because the necessary and eternal can alone be absolute uncreated being;

If you say it is contingent and created, you still assert the necessary and eternal, because the contingent and created is neither possible nor intelligible without the necessary and eternal;

Therefore whether you assert either necessary and eternal, or, contingent and created being, you always assert that God is.

XIV. 1. What kind of Truth has our study of Logic so far dealt with? Define that kind of Truth. 2. What is the next stage in our enquiry? Why? What relation does this stage bear to the end of Logic?

XV. What is method? In what relation does it consider thought? What are its functions?

XVI. Name the division of method, and the reasons for it.

2. What part of Method regards objective Truth *as a whole?* Why?

XVII. 1. What do you understand by definition? How is the meaning of the term seen in its derivation?

2. What terms include widely every kind of definition? Why?

3. What is the difference between nominal and real definition?

4. Enumerate the different kinds of nominal definitions; then examine the following, and specify the kind of each:

(a.) Light is that medium by which we see the colours and shapes of things.

(b.) a comet is a hairy star.

(c.) a telescope is that with which we can see from afar.

(d.) This is a copy of *The Stones of Venice*.

(e.) This is the *Contemporary*. Those are copies of *Aletheia*, and the *Formation of Christendom*.

(f.) An ephor is an inspector.

(g.) The moon is a heavenly body that shines and gives light by night.

5. Clearly distinguish the descriptive, genetic, and essential definition; showing in what they agree, and in what they differ.

6. Why is essential definition the only satisfactory kind of real definition? Why is it called conceptual definition?

7. What is the difference between a metaphysical and a logical definition? In what do they agree? What are matter and form?

8. Why must proximate genus and ultimate differentia form the components of every logical definition?

9. Why may an essential definition be considered a sort of compendium of our knowledge of a thing?

10. Explain how and why definition is limited (a) from above, (b.) from below.

11. What things cannot be defined? Why not? What two genera divide all being? How?

12. How is definition perfected?

13. Give an original example of each kind of real definition, and your reason for forming it as you do.

XVIII. 1. What is meant by a definition being (a.) adequate and exclusive, (b.) short and exact or distinct?

2. Why should a definition be (a.) clearer than

the thing defined, (b.) non-negative? When may a negative definition be legitimately employed?

3. Examine the following definitions; reject those which are faulty, and say *why* you reject them; if after this any remain, distinguish them severally as descriptive, genetic or essential, and say why you have done so; (a.) "A strong dilemma is a desperate case."

(b.) Calomel is dichloride of mercury.

(c.) An interpreter is one who interprets.

(d.) A euphemism is a rhetorical figure by which a delicate word or expression is substituted for one which is harsh or unseemly.

(e.) Man is his Maker's "chief delight and favour."

(f.) The *Tis* was the public opinion or public judgment of the Homeric world.

(g.) "A thing of beauty is a joy for ever."

(h.) A pen is an instrument made to hold fluid ink, and to spread it over paper.

(i.) Cheerfulness is the bright weather of the heart.

(j.) Astronomy is a science which treats of the solar system.

(k.) "Virtue is voluntary obedience to truth."

(l.) Courage is not boldness, it is not audacity, it is not impunity, it is not assurance; it is not daring: it is that quality which enables men to encounter danger and difficulty firmly and fearlessly: it bears a generic relation to bravery, intrepidity and heroism; and a specific relation to fortitude.

(m.) Light is produced by wave-like motions in a highly elastic medium which pervades all space.

(n.) He was a man, take him for all in all,
See what a grace was seated on this brow;
Hyperion's curls, the front of Jove himself,
An eye like Mars, to threaten and command;
A station like the herald Mercury
New-lighted on a heaven-kissing hill;
A combination and a form indeed,
Where every god did seem to set his seal
To give the world assurance of a man.[1]

XIX. 1. What is division? What is its relation to definition? What does every division connote?

2. Distinguish (a.) an actual, potential and moral whole; (b.) a physical, metaphysical and logical whole; (c.) partition, division in the strict sense of the term, and distribution.

3. What kind of wholes are the following: Virtue; confidence; beetle; chimpanzee: navy; House of Lords; desk; tree; flower; science; literature; rascal.

4. The basis of division may be either external or internal: when is it external? when internal? Illustrate your explanations by examples. Why may we have various co-ördinate divisions of the same whole?

5. Upon what principle are sub-divisions formed? What is their use?

XX. 1. Why is division of a whole into two species or classes only, the best means of ensuring the adequacy and exclusiveness of a division? Give any illustration not in the text.

2. What is meant by the co-ördination of the parts of a division, and by the parts mutually excluding each other?

[1] *Hamlet*, a. 1.

3. The division must be regular or orderly: illustrate the application of this rule.

4. What are the disadvantages of too minute sub-division?

5. Are the following divisions correct or faulty? Give the reason for your judgment of each one. (a.) "Marmion" consists of a prologue, six cantos, Sir David Lindesay's tale and l'envoi; (b.) That article runs over seven pages and two half-pages; (c.) Mivart's "Lessons from Nature" contain fourteen chapters, a starting-point and a postscript.

(d.) From a biographical point of view, history may be divided into the history of generals and the history of gamblers.

(e.) A sentence may be divided into words, letters, subjects, adverbs, predicates, nouns, adjectives, letters and stops.

XXI. 1. What is the office of argument? What is its end? Upon what does its value depend?

2. Name and distinguish the two great classes of arguments.

XXII. 1. What is Demonstration strictly so-called? How is it accomplished? 2. Show how all demonstration is based upon the axiom that "Truth contains nothing but the true;" and draw out the consequences of this statement.

2. Of what does the *matter* of Demonstration consist? What is meant by the "state of the Question?"

3. What is a *principium per se notum*, an axiom, a postulate?

4. What is the *Form* of Demonstration? Of what is it the basis?

5. Why is Demonstration essentially dependent upon the *principia per se nota?*

6. How is Demonstration limited from above and from below?

XXIII. 1. What is the rule for the thesis? When is an explanation of the state of the question invariably called for before beginning the argument?

2. What are the rules for the principle of demonstration?

3. What are the rules for the syllogism considered as part of the argument?

XXIV. 1. In direct opposition to all these rules are fallacies or sophisms; what are they? why are they treated of just after these rules? How are they classed?

2. Name the fallacies contrary to the rules of the syllogism, and say of each kind whether it is formal or material.

3. What is the fallacy of *Amphibology* or *ambiguity?* How can it be unmasked? In what does its inaccuracy consist? How do the following fallacies illustrate your answer:

(a.) He who sends forth a book into the light desires it to be read;

He who throws a book into the fire sends it into the light;

Therefore he who throws a book into the fire desires it to be read.

(b.) Bears and lions kill men;

The constellations Ursa Major, Ursa Minor and Leo are bears and lions;

Therefore they kill men.

(c.) Dogs bark;
Sirius is a dog;
Therefore Sirius barks.

(d.) "If thou never wast at court, thou never sawest good manners; if thou never sawest good manners, then thy manners must be wicked; and wickedness is sin, and sin is damnation. Truly, shepherd, thou art in a perilous state."[2]

4. What is the fallacy of *Composition and Division?* In what does its fault consist? How may it be unmasked? Prove what you have said from the following examples:

(a.) It is impossible for white to be black;
But this paper is white;
Therefore it cannot become black.

(b.) "Three and two are odd and even numbers;
Five is two and three;
Therefore five is odd and even."

5. Explain the fallacy of *Collective and Distributive meaning.* How does it violate the rules of the syllogism? How do I fall into this fallacy by concluding that, because the ministers in Cabinet Council came to a wise decision, therefore any one of them would have done so singly?

6. How do we pass from a "*dictum secundum quid*" to a "*dictum simpliciter?*" Why should we not do so? A lunatic would fall into this fallacy if he argued that I ought not to take his sword from him, because no man should withhold the property of another: where does the inaccuracy of reasoning lie?

7. What is the *fallacia accidentis?* Give two or

[2] *As You Like It*, iii. 2.

three examples, and show where the fault lies in each. The child of a soldier in the Scotch Greys infers that all horses are grey, or a Malay infers that all persons are yellow; why is each of these inferences a *fallacia accidentis?* How may this fallacy be unmasked?

8. When Ikon, the hero of Miss Giberne's charming instructive story, *Among the Stars*, argues that "winter has come because we have frost and snow," and that "Fritz knows a great deal about the stars because he has a telescope," what fallacy is he making use of? In what does this fallacy consist?

9. Tell me five or six ways in which the question may be evaded, and give an example of each. How is the question evaded in each of the following arguments:

(a.) "Human knowledge is at best only progressive," is the proposition for proof; and the points proved are, that there is no royal road to learning, and that all short schemes should be rejected as dangerous.

(b.) A boy under examination has failed in arithmetic; not to lose his marks, he argues that he has passed in algebra, and that the problems in algebra involve a knowledge of the arithmetical rules in which he has failed: why am I justified in witholding his marks?

(c.) A witness charged by counsel with being absent-minded, replied, "Impossible, for I am here present."

(d.) In proving that Mrs. Siddons was a good actress, why may I not argue that she was a good woman, as was actually the case?

10. What is the fallacy called *begging the question?* Name three ways in which it may be done; and show how each of the following is a *petitio principii:*

(a.) Anger is short madness, for everyone in a passion is temporarily insane.

(b.) History affords political wisdom because many statesmen have become wise by reading history.

(c.) We cannot possibly undertake to teach that the earth moves round the sun, for we have always held the opposite theory that the sun moves round the earth.

(d.) The end of the world must be very near, for things are so different from what they were when we were young, that it is hard to see how they could be worse.

11. Are the following examples of the *vicious circle,* or not? If so, in what does their inaccuracy consist:

(a.) I prove that the earth is round by the way in which ships gradually disappear when going out to sea; then I prove the cause of this manner of disappearance by the round form of the earth.

(b.) Some months ago, a journalist tried to prove that drunkenness is the cause of popular misery; and in the course of the same leader argued that popular misery is the cause of drunkenness.

(c.) We know that "*The life of a Prig,*" *by one,* is true, because it is a piece of autobiography written by one who could not be mistaken about the incidents of his own life, and we know that

it is an autobiography because the book tells us it is so.

(d.) Ernest is urged to go in for rowing because he must get strong; and his brother Arthur is urged to get strong because he must go in for rowing.

To avoid arguing in a circle, what caution must be observed in purely objective scientific arguments?

12. What is the fallacy of *False Generalization* or *Invalid Induction?* Give an example: How many forms has this fallacy? What are they? Examine the following, and show how each is an instance of False Generalization:

(a.) I have just had a rocking-horse given me; now my father rode on his horse from Bath to Wells yesterday, right over the Mendip Hills: I'll do the same to-morrow on my rocking-horse.

(b.) A little girl, who plays the part of a fairy-queen at Drury Lane, argues that, because the gold and stones in her stage crown are mere tinsel and glass, therefore all royal crowns are valueless tinsel and glass.

(c.) Of a family of nineteen children, one boy is half-witted, and another is deformed; a rough and ready acquaintance leaps to the conclusion that all the nineteen are, from first to last, crazy either in mind or body.

(d.) Animals are irrational; therefore man, being an animal, is irrational.

(e.) More rain falls on the west than on the east coast of England; therefore more rain falls at Southport than at Yarmouth.

13. Whence the saying, "a fallacy is a nest of

fallacies?" In the division of fallacies, why do not the parts of the division mutually exclude each other?

14. State what fallacies you can detect in each of the following arguments; and say of each whether it violates rules for the syllogism, or the thesis, or the ground of demonstration:

(a.) Stars are bright because they shine; and they shine because they are bright.

(b.) "If that is good enough to be put in a book, it is good enough for you and me."

(c.) Obedience to authority is according to nature; but disobedience to authority is according to nature; therefore obedience to authority is disobedience to authority. Obedience to authority, being according to nature, is from God; therefore disobedience to authority, being according to nature, is from God.

(d.) Cows have crumpled horns; the moon is not a cow; therefore the moon has not crumpled horns.

(e.) The British army abandoned Kassala; but Sir Evelyn Wood is in the British army; therefore Sir Evelyn Wood abandoned Kassala.

(f.) Any cat has one tail more than no cat; but no cat has two tails; therefore any cat has three tails.

(g.) No timepiece can go on a frosty night, because my timepiece has stopped twice on frosty nights.

(h.) Writing ought never to be acquired, because by its means men have committed forgery.

(i.) He who pursues nothing but pleasure cannot

be happy; for it is in the nature of things that, if we give ourselves up exclusively to one pursuit, it becomes wearisome.

(j.) The kingdom of Anarchia is in distress because it is badly governed; hence every distressed kingdom is badly governed.

(k.) Inferring from the conduct of his creditors that all men are bad, Timon of Athens argues:

> All is oblique:
> There's nothing level to our cursed natures
> But direct villany.

(l.) The *minimum visibile* is the least magnitude which can be seen; no part of it alone is visible, and yet all parts of it must affect the mind in order that it may be visible; therefore every part of it must affect the mind without being visible.

(m.) I am offered a reward to assist this man in gaining an office he desires; to assist a man is to do him good, and no rule of morality forbids the doing of good; therefore no rule of morality forbids me to receive a reward for assisting this man in gaining the office he desires.

(n.) Ingersoll asserts the eternity of the universe; proof of his assertion he gives none save that it is "according to my idea."

(o.) The blind cannot read; you cannot read in the dark; therefore you are blind.

XXV. 1. By what is the division of the kinds of Demonstrative Arguments determined?

2. Explain and distinguish the arguments called *a priori* and *a posteriori*. How do their names indicate their nature? Give an example of each. Which

kind is mainly used in experimental science, in mathematics, in historical criticism?

3. Of the following arguments one is *direct*, the other is *indirect*: tell me why they are so respectively; and in your answer show the nature of each, and the difference between them:

(a.) No stone is a living being;
But every man is a living being;
Therefore no man is a stone.

Your opponent denies the conclusion on the plea that, as the arboreal ancestor of our race was an apelet, it may equally well be affirmed that the apelet's ultimate progenitor was a stone; so you reply:

(b.) Certes, no stone is a living being;
But some men are stones;
Therefore some men are not living beings, which is absurd.

Distinguish the relative value, force and use of the indirect and direct arguments.

4. Give an example of an *argumentum ad veritatem* and of an *argumentum ad hominem*. Why are the former called *objective* or *absolute*, and the latter *subjective* or *relative?* What is their respective value? When is the use of subjective arguments never admissible? What is meant by arguing *ex concessis?* What is retorsion?

5. What are (a.) *Progressive* and *Regressive* arguments, (b.) *Main* and *Subordinate* arguments. Adduce an example of each.

6. What is the popular distinction between *Deduction* and *Induction?* Why is it faulty? Why is it incorrect to identify Deduction and Demonstra-

tion, and to consider Induction a form of reasoning altogether distinct from demonstration?

7. What is (a.) the wide, (b.) the exact meaning of *Deduction?* What is its most general formula? The following are examples of deductive arguments; show how they are so, and trace the *a posteriori* element in each:

(a.) Every corporeal substance has in itself quantity and force;

But every atom is a corporeal substance;

Therefore every atom has in itself quantity and force.

(b.) All good men are estimable;

But some good men are not esteemed;

Therefore some who are not esteemed are estimable.

8. What is the (a.) wide, (b) the exact meaning of *Induction?* Name its formula; and, from any example, trace the *a posteriori* element in induction.

Why is complete induction practically impossible? Why is it useless? How far is it necessary to carry incomplete induction in any given case? Upon what axioms is it based? For what reason? Why are the principles contained in these axioms universal and necessary? In what circumstances and by what is this universality and necessity conditioned? Prove that an inductive argument is essentially demonstrative.

What rules should be observed in inductive arguments? Give a reason for each rule.

An inductive argument, because it is a logical argument, is beyond a doubt in logical form: prove how this is the case (a.) in complete, (b.) in incom-

plete induction. What right have we to make use of the suppressed premiss in induction? Prove how in induction we are really reasoning about universals throughout, although we are said to proceed from the particular to the universal. How can you meet the difficulty that an induction is an invalid syllogism, because the conclusion has greater extension than the premisses?

What is the value of induction in science? Why? How far is induction a method of everyday reasoning? Why may not induction be applied to facts of the moral order?

9. What are Probable Arguments?

XXVI. 1. Explain what is meant by an argument from *Analogy*. Distinguish its three kinds. Why are these arguments not demonstrative? Upon what does their degree of probability depend? What is their use? Examine the following; name the kind, and say what you think of the force of each, supporting your opinion by reasons:

(a.) For a transitory gain men labour and toil; much more therefore should they labour for an eternal reward.

(b.) Springs are little things, but they are sources of large rivers; a helm is a little thing, but it governs the course of a ship: so, therefore, are words and looks, which are little things, powerful for good or evil.

(c.) The author of *Antoine de Bonneval*, thus supports the proposition that differences of mind as well as likenesses contribute to the charm of free colloquial intercourse: "As in music, so is it likewise in discourse. There are in the first, not

only recurring octaves, that ring out to each other immediately in clear response, but also deflections, regular intervals, and subtle gradations from key to key, and approaches to actual discord, that mingle and intertwine to perfect the melody in its progress. So, too, in the intercourse of one thoughtful mind with its fellow, it is as much the evolving of differences, salient but not irreconcilable, demanding energy of argument to sustain, and breadth and reach of thought to test them, that make the charm of free discourse, as thoughts that actually chime together, and conclusions which have been reached by a similar process of reason."

(d.) The safety of that upper storey has been secured by its timber beams; therefore it will remain secure when they are replaced by iron.

(e.) If the "Masters in Israel" speak such things; therefore may we, insignificant mortals.

(f.) As the tongue is like a race-horse, which runs the faster the less weight it carries; so, therefore, can those who talk on trifles speak with the greatest verbal fluency.

2. What is an argument from *Congruity?* What is its use,—its form,—its scientific value?

3. Answer the same questions regarding *Hypothesis.* What is a *theory* in science? What conditions must be observed in every argument from hypothesis?

XXVII. 1. What is scientific knowledge in relation to demonstration? What is in its subjective aspect? Why does it mainly regard the *causes* of the thing known?

2. Causes are of four kinds: name and explain

each kind; then give an illustration embracing all the four.

3. What have causes to do with scientific knowledge considered objectively? Why is scientific knowledge essentially *system?* Prove now how it is the result of method.

4. St. Thomas says, "there are three, and three only requisites for science:" what are they? What connection is there between them and the twofold description of scientific knowledge?

5. Why must the first principle of any system be true? What would result from starting from a wrong point, and using a wrong method? What is the "right place" of any part in a system? Nothing unproved may be admitted into a system: why is every *lemma* an exception to this rule? What are corollaries? Why are they admitted unproved?

XXVIII. 1. What is the difference between the material and formal object of a science? Illustrate the distinction by an example.

2. What is meant by the *subordination* and *superordination* of the sciences? What is the ground of this gradation?

3. Metaphysics is supreme among sciences: why? What is its subject-matter? Why is not this supremacy assigned to Dogmatic Theology?

4. Explain the term *subalternation* of the sciences. What makes some sciences subalternate, and why? Give some examples.

XXIX. 1. What is (a.) the theoretic, (b.) the practical end of Knowledge?

2. In what sense is it true to say that philoso-

phical or scientific knowledge is its own end? For what reason? How does subjective knowledge and its subjective end connote Truth and Certainty?

C.

What is the "end of the act of the agent" in Logic? In treating of it how many and what things have to be considered?

I. 1. In what does the *material* truth of thought consist as distinguished from its *formal* truth? Why is it called *conceptual* truth?

2. How far does conceptual truth represent the object of thought?

3. What is material error?

4. Why and how does material truth reside primarily in the judgment, and not in simple apprehension?

5. Explain how the same thing happens with respect to error; and say why error is called assent to a false, or dissent from a true proposition.

6. Why are there necessarily many classes of conceptual truth? Distinguish supra-rational and rational truths, and illustrate the distinction by examples. Why can supra-rational truths never be contrary to reason? What do you understand by saying that they are either negatively or positively according to reason?

7. What is (a.) a necessary, (b.) a contingent truth? When is a truth (a.) absolutely, (b.) hypothetically necessary?

8. Distinguish and give examples of truths (a.) *a priori* and *a posteriori;* (b.) analytic and synthetic; (c.) ideal and experimental; (d.) mathematical,

metaphysical, and physical; (e.) moral and religious; (f.) theoretical and practical.

II. 1. What is *ignorance* with regard to truth?

2. What is (a.) objective, (b.) subjective *doubt?* What is its cause? How is it stated by St. Thomas? How does that statement indicate two kinds of doubt?

3. Distinguish objective and subjective *opinion.* Give St. Thomas' statement of the latter. Explain the cause of opinion, as a mental state; and give some examples of it.

4. What is objective *certainty?* Why must it be synonymous with truth? What is subjective certainty or certitude in its restricted and in its wide meaning? What is its object, according to St. Thomas? Why is subjective certainty in its wide meaning not necessarily conjoined with truth?

5. Explain how ignorance, doubt, and opinion are attitudes of the mind with respect to error as well as with respect to truth?

III. 1. Explain shortly the kinds of objective certainty, *i.e.*, certainty considered as a quality of propositions.

2. How may subjective certainty, *i.e.*, certainty considered as a state of the mind, be either metaphysical, physical, or moral? Give examples.

3. Why is it true to say that subjective certainty may, and must admit of degrees?

4. What is the difference between (a.) natural and scientific, (b.) natural and supernatural certainty.

5. If I am certain of the following propositions, what kind of certainty have I in each case:—Venus is not inhabited by human beings; two and two

are four; the sun will rise to-morrow; Ireland will eventually become prosperous; the lime-trees will be in full leaf in two months.

6. I am certain that the Second Person of the Blessed Trinity became Incarnate: that Jerusalem was destroyed by the army of Titus; that the flowers I have just put into water will be faded in two days; and I am certain, after working out the problem, that in equal circles, equal angles stand upon equal circumferences, whether they be at the centres or circumferences:—what kind of certainty have I in each case?

IV. 1. What is the twofold signification of a "source of knowledge"? What, their twofold character?

2. Name the sources of knowledge. What points form the subject of our inquiry in treating of each one?

3. What is *internal experience*, or *self-consciousness?* Whence does it result? What truths do we get to know by its means? Name the reasons for its trustworthiness.

4. What is *external experience?* Upon what does it depend? What objects do we come to know by its means? In what relation? Upon what two conditions does the report of the senses depend? Upon what conditions does the trustworthiness of their report depend? Why cannot the trustworthiness of the senses, as a source of knowledge, be matter for doubt, if these conditions are present?

5. Why is *Reason* called a source of knowledge? Why and how is it twofold in this character? What is the *discernment or light of reason* considered

as a source of knowledge? Mark a distinction in the light of reason similar to that in subjective knowledge. What are the truths cognized by this means? Show to what extent its testimony is trustworthy.

6. What is *common sense?* Prove that it is a form, or rather an exercise of reason. In what does it differ from the exercise of the discernment or light of reason? What kind of truths come to us by way of common sense? Enumerate some of them. What are the conditions which ensure its trustworthiness? Given these conditions, why is its trustworthiness beyond doubt?

7. From what does *Authority*, as a source of knowledge, proceed? What is faith as the correlative of authority? Upon what does faith depend as a ground for certainty? What is (a.) a witness, (b.) testimony? What truths do we get to know from *human authority?* What is the value of dogmatic testimony as a motive of certainty? What is its value as an instructor? Give some examples.

8. What is the office of historical testimony? What are its three channels? Its trustworthiness depends primarily on the credibility of the witnesses, and this in its turn depends on certain conditions: what are they? Upon what does the integrity of human testimony depend? What are the ordinary grounds for belief in human testimony?

9. Is *Divine Authority* a natural source of knowledge? Is the knowledge of Revelation natural or supernatural knowledge? Why? Why is it necessary to consider Divine Authority among the sources of knowledge? What classes of truths do

we know by its means? How far is Revelation a necessary medium for the knowledge of each class? What guarantee have we of the trustworthiness of Revelation. The duty of accepting it presupposes two conditions: what are they?

V. 1. Why are the natural sources of knowledge insufficient criteria of Truth? What further criterion is needed? Why?

2. This criterion cannot be simply subjective: why not? What *is* the *Criterion of Truth?* Think over the definition: then explain *how* the Criterion is mainly objective, and in some measure subjective.

3. Distinguish and illustrate metaphysical, physical, and moral objective evidence. Then distinguish (a.) extrinsic and intrinsic, (b.) immediate and mediate objective evidence. What is the subjective meaning of evidence?

4. Does objective evidence *actually* induce the intellect to assent, and determine it to pronounce a judgment in the generality of cases? What does? Why so? Distinguish it from objective evidence. Give some examples.

5. Can false propositions ever be evident? How comes it then that we consider them so?

6. Is Objective Evidence the Criterion of Truth for the Truths of Revelation? What is? For what natural truths is this criterion a safer one than objective evidence? Why is it a negative criterion for all natural truths? Why is the assent of faith always a free act?

7. Why is the question of Conceptual Truth and Certitude of such importance?

VI. 1. Two classes of conclusions may be drawn

from its examination. Name those of the theoretic class, and show how they are the outcome of what has been said on Method, Truth, and Certainty.

2. What is the way to rid ourselves of prejudices? Why are the dominion of feeling and passion, and one-sidedness in our mental habits, inimical to the attainment of truth? How is the study of Logic conducive to its attainment?

3. A habit of shirking the labour of thought stands in the way of the attainment of Truth: why? Why is this habit often accompanied with "viewiness"? Method in study and reading, and control of the imagination minister to the attainment of Truth: why?

4. Verbosity and its contrary, excellence of style, are sometimes calculated to lead minds away from truth: why? and in what circumstances?

5. Why should we consider ourselves obliged to aim at securing mental accuracy?

6. Do all the foregoing rules apply to mental relaxation? In what measure does relaxation minister to the attainment of Truth? If we take them for the direct road to it, what will be the character of our certainties?

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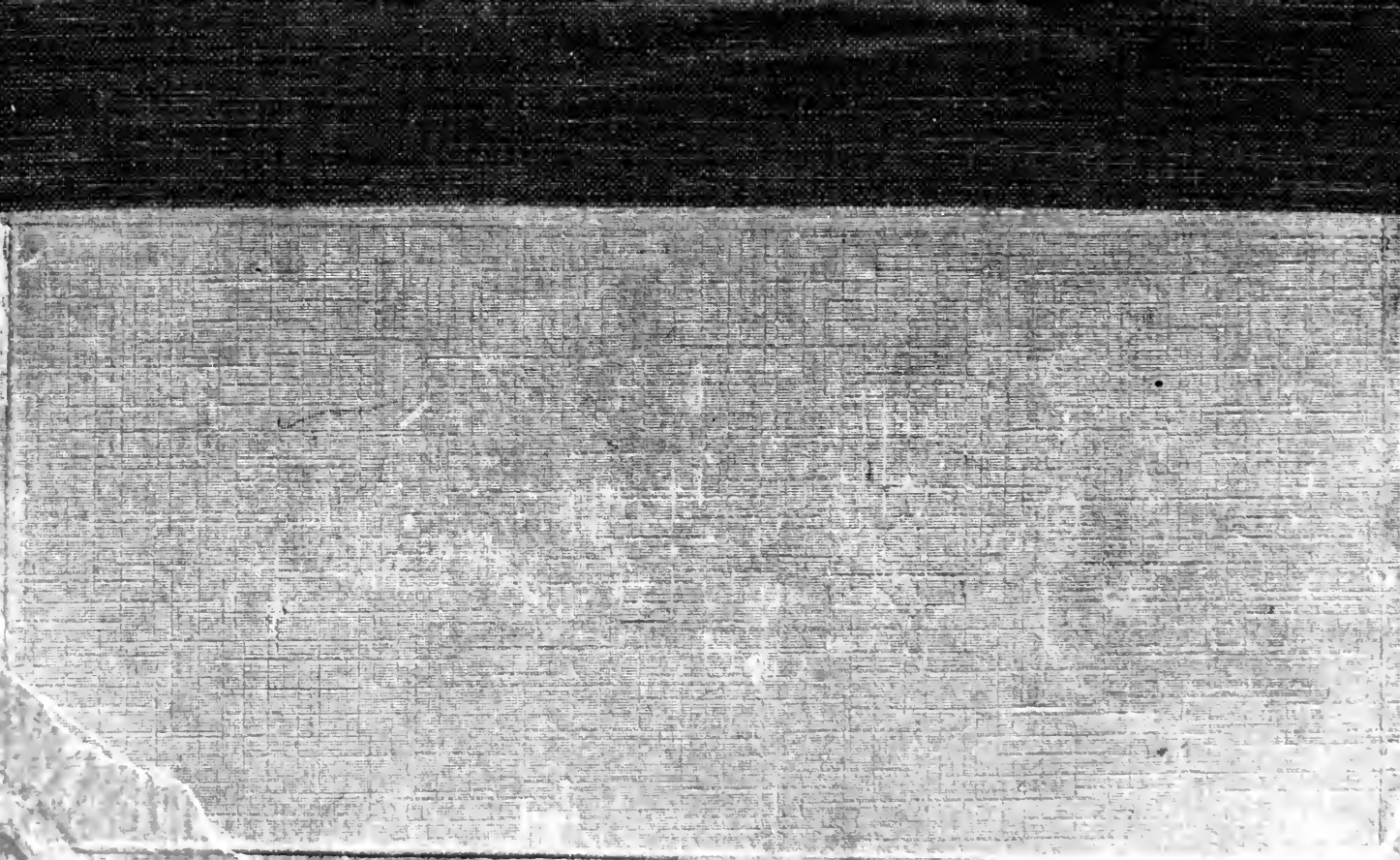

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A SHORT
HISTORY OF LOGIC

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A SHORT
HISTORY OF LOGIC

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PREFACE

THE article on Logic which Professor Adamson contributed to the ninth edition of the *Encyclopædia Britannica* consists of a critical survey of the history of logical theory; its value is well known to philosophical students; and no apology is needed to justify its publication in separate form. It may be mentioned, however, that this publication was thought to be important at the present time, as the work was in danger of becoming less easily accessible owing to the issue of the eleventh edition of the *Encyclopædia*, in which it is not reprinted.

The manuscript of the article has been fortunately preserved — alone among the manuscripts of the author's published writings. It is much fuller than the printed article, a number of passages—some fifty in all—having been struck out by the editor with a view to economy of space. These passages affect both text and notes; they vary in length from a few words to whole sections; they vary also in importance; but the author's own opinion was that the value of his

work had suffered by their omission; and with this opinion I agree. In the present book these passages have been restored to their place, so that the article as it left the author's hands is now, for the first time, placed before the reader.

The manuscript bears no trace of the editorial blue pencil, and the original proof no longer exists: so that a doubt may arise as to whether any particular omission may not have been made by the author himself when he corrected the proofs. But it is clear, from a comparison of manuscript and print, that his proof-corrections were few and unimportant. No real difficulty, therefore, has arisen in deciding upon the restorations. The author's style was so concise that greater brevity could not be attained without sacrifice of the matter.

It should be borne in mind that the article on Logic was written and published in 1882. The supplementary articles, by which it is followed in this volume, are all contributions to the history of logic; but the first of these—that on Category, also reprinted from the *Encyclopædia Britannica*—dates from six years earlier; and only the last carries the story on towards a more recent development of logical theory. Readers of the author's works do not need to be reminded that his own point of view underwent modification, and that there are some things here which he might have expressed differently had he revised the work himself.

With the author's manuscript and printed copy before me, my own work as editor has consisted chiefly in selecting the material and seeing it through the press. Some omitted references have been supplied; a few slips of the pen or the press, formerly overlooked, have been corrected; unwieldy paragraphs have been broken up, and the punctuation has been simplified; but nothing new has been added to text or notes. I am responsible for the choice of a title.

It remains for me to express my grateful thanks to the Syndics of the Cambridge University Press for allowing the publication of the articles on Logic and on Category in the present form. For permission to reprint the critical notices from *Mind*, with which the volume ends, I am indebted to the kindness of Professor Davidson of Aberdeen, literary executor of the late Professor Bain.

W. R. SORLEY.

King's College,
Cambridge, *October* 1911.

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SHORT HISTORY OF LOGIC

I

PROVINCE AND METHOD OF LOGIC

1. Logic, in the most general acceptation of the term, may be regarded as the systematic study of thought. So wide a definition is certainly sufficient to comprehend all that may have been at various times included within the scope of logical doctrine, but in other respects it is of small value. For it seems essential that to any separate and independent theory there should be assigned a distinct province and a distinct method. But neither province nor method, as in any way special or peculiar to logic, is marked off by the above description. The terms *thought* and *systematic study*, indicating the object and method of logical treatment, might, even in similar combination, be appropriately used in defining, totally or partially, philosophic disciplines not generally viewed as synonymous with logic. They do not serve, therefore, to mark off logic from philosophy as a whole, which is unquestionably the systematic exposition of thought, nor from psychology, which includes

within its wider range what may well be described as the study of thought. That some more accurate discrimination of the province and method of logic is absolutely necessary will readily be granted; for, in default thereof, neither the extent of matter to be included within the study nor the peculiarity of the method by which such matter is treated can be determined. The boundaries of logic and its essential constitution must otherwise remain fluctuating and vague.

Preliminary queries of a similar kind are naturally encountered in the case of all other branches of human knowledge; and though it is to be acknowledged that many of the sharp distinctions by which one is differentiated from the other are provisional merely, and demand restatement when a somewhat higher point of view is reached, yet their necessity and utility must be allowed. The sciences are not advanced but retarded when their provinces are allowed to overlap and become indeterminate. There are two methods by which these preliminary questions are generally answered — two methods which in themselves express directions of human thinking and which have at all times occupied a remarkable place in the system of logic. We may refer either to the distinct characteristics of the matter to be treated, or to the essential features of the method of treatment. We may determine the province of a science either by external division, by classification of objects according to their prevailing resemblances and differences, or by internal definition, by exposition of the fundamental characters of the method employed in the science. By neither process, unfortunately, can an unambiguous answer be supplied, at least without much art, in the case of logic. Neither by classification of the sciences, and assignment of some specific place in the general hierarchy to

logic, nor by precise determination of the character of logical analogies as opposed to all other forms of study, can there be readily attained a definition, at once full and exact, of the system of logic.

2. The reasons for the manifold difficulties encountered in the attempt to determine accurately the province of logic, whether by reference to a division of the sciences or by precise definition of the essential features of logical analysis, are not far to seek. The systematic classification of the sciences is not the result of mere observation and comparison; the selection of the points of agreement and difference involves not only consideration of the contents of the sciences as empirically presented, but also certain leading principles or fundamental views, which are in essence of a philosophical character. According to the general conception of knowledge which in various kinds is manifested in the special sciences, there will be radically divergent methods of classification, and the province assigned to each member of the ensemble will, for the most part, have its limits determined according to the character of the general view adopted. Moreover, if any of the more prominent specimens of classification of the sciences be critically inspected, they will be found to presuppose a certain body of principles which are wider in scope than any of the special disciplines, and to which no place in the ensemble can be assigned. In short, a systematic distribution of human knowledge into its distinctly marked varieties rests upon and presupposes a general philosophy, the character of which affects the place and function of each part of the distribution.

Logic, as may readily be imagined, has therefore experienced a variety of treatment at the hands of systematisers

of scientific knowledge. It has appeared as one of the abstract sciences, in opposition to those disciplines in which the character of the concrete material is the essential fact; as a subordinate branch of a particular concrete science, the investigation of mental phenomena; as a nondescript receptacle for the formulation in generalised fashion of the method and logical precepts exemplified in the special sciences. By such processes no more has been effected than to bring into light, more or less clearly, some of the characteristics of the supposed science, without in any way supplying an exhaustive and comprehensive survey of its boundaries and relations to other branches of knowledge.

Thus, when logic is marked off from the concrete sciences and associated with mathematics in the most general sense, as the treatment of formal relations,[1] and further differentiated from mathematics as implying no reference to the quantitative character of the most general relations under which facts of experience present themselves,[2] there is certainly brought to the front what one would willingly allow to be a commonplace respecting all logical analysis, namely, that its principles are coextensive with human knowledge, and that all objects as matters of conscious experience have an aspect in which they are susceptible of

[1] As, *e.g.*, by H. Spencer, *Classification of the Sciences*, pp. 6, 12; H. Grassmann, *Die Ausdehnungslehre von* 1844 (1878), Einleitung, xxii.–xxiii.

[2] Logic and mathematics, under this view, may be regarded either as generically distinct—which is apparently the opinion of Spencer, H. Grassman, and Jevons—or as species of a more comprehensive genus, the theory of formal (symbolic) operations—which is apparently the opinion of R. Grassman (see his *Formenlehre*, 1872) and Boole (see his *Mathematical Analysis of Logic*, 1847, p. 4, and *Differential Equations*, 1859, chap. xvi., specially pp. 388, 389). An admirable treatment of that which is implied in Boole's method is given in Mr Venn's *Symbolic Logic*, 1881.

logical treatment. But no more is effected. It is still left to a wider consideration to determine what the specific aspect of things may be which shall be called the *formal* and be recognized as the peculiarly logical element in them. There may be selected for this purpose either the general relations of coincidence and succession in space and time, or the fundamental properties of identity and difference, or the existence of classes; but in any case such selection depends upon and refers to a theory of the nature of knowledge and of the constitution of things as known. In truth, the notions of *form* and *formal relations* are by no means so simple and free from ambiguity that by their aid one can at once solve a complicated problem of philosophic arrangement. To lay stress upon *form* as the special object of logical treatment still leaves undecided the nature and ground of the principles which are to be employed in evolving a science of form, and therefore leaves the logical problem untouched.

Still less satisfactory are the results when logic is regarded as in some way a subordinate branch of the psychological analysis of mental phenomena.[1] Neither the grounds on which such a classification rests, nor the conclusions deduced from it, seem beyond criticism. The simple facts that certain mental processes are analysed in logic, and that psychology is generally the treatment of all mental processes, by no means necessitate the view that logic is therefore the outgrowth from and a subordinate part of psychology. For it is clear, on the one hand, that logic has a scope wider than psychology, since in any sense of the term it has to deal with all the processes (or with some aspect of all the processes)

[1] For this extremely common arrangement, see Hamilton, *Lectures on Metaphysics*, i. p. 121-3; Ueberweg, *System der Logik*, § 6.

by which on any subject knowledge is formed out of disjointed or disconnected experiences. And, on the other hand, since the subordination of one science to another, as species to genus, is fallacious, unless the two agree in fundamental characteristics, the position so assigned to logic would imply that in aim and method it shall be essentially one with psychology, a position equivalent to the negation of logic as a separate and independent discipline.

It is not surprising therefore to find that, so soon as logic has been distinguished as arising from psychology, and so dependent on it, the peculiarity of its position and functions compels the recognition of its more general scope and the reduction of its connection with psychology to an amount small enough to be compatible with absolute independence. Strong reasons, indeed, may be advanced for holding that logic is entirely to be separated from psychology, as differing from it in aim, method, and principle, that logical analysis is generically distinct from psychological, and that the two disciplines, while connected as parts of the general body of philosophical reflection, hold to one another a relation the reverse of that commonly accepted.[1]

As to the endeavour to collect from consideration of the sciences in detail a body of precepts, the rules of scientific method, and to assign the systematic arrangement of such rules to one special discipline, called logic, it seems to stand on the same footing and to be open to the same criticism as the allied attempt to treat general philosophy

[1] It is to be acknowledged that most of the writers on logic who emphasise the connection of psychology with logic introduce distinctions equivalent to the remarks above made, but the grounds for such distinctions and the conclusions to be deduced from them are not generally brought into clear light.

as the receptacle for the most abstract propositions reached in scientific knowledge. There is a peculiar assumption underlying the supposed possibility of distinguishing between scientific method and its concrete exemplifications in the special sciences, and only on the ground of this assumption could there be rested the independence of logic as the systematic treatment of method. It is taken for granted, without examination, that the characteristic features of correct and well-founded thinking are palpable and general, and that we thus possess a criterion for marking off what is common to all scientific procedure from that which is special and peculiar to the individual sciences. An elaborate philosophic doctrine lies at the root of this assumption, and the position assigned to logic may easily be seen to depend, not on what is apparent in the argument, namely, comparison of the sciences with one another, but on what lies implicit in the background, the philosophic conception of the nature of scientific knowledge in general. Without reference to the ultimate philosophic view, no definite content could be assigned to logic, and it would remain impossible to distinguish logic from the sciences in detail.[1]

3. Thus the various attempts to define the province and functions of logic from general classification of the sciences, to define, in short, by the method of division, yield no satisfactory answer, and refer ultimately to the philosophic view on which classification and division must be based. A similar result becomes apparent when we consider the

[1] See, for a clear statement of this impossibility, Comte, *Philos. Positive*, i. 34, 35. Definitions of logic as theory of method, which are based on general philosophic views (*e.g.*, the definition by Sigwart, *Logik*, i. § 1), stand on a different footing, and are to be examined on different principles.

various descriptions of logic that have been presented as following from more precise and accurate determination of the essential features of logical analysis and method.

"The philosophical deduction or construction of the notion of logic presupposes a comprehensive and well-grounded view, whether of the nature and mode of operation of the human mind, a definite part of which falls under logical treatment, or of the problems and objects of philosophy in general, from among which in due order may be distinguished the particular problem of logic."[1] The most elementary distinctions, by means of which, in the ordinary exposition of logic, progress is effected towards an accurate determination of the province of the science, not only refer to some such ultimate philosophic view, but lead to the most diverse results, according to the peculiarity of the views on which they are based. Of these elementary distinctions the following are at once the more usual and the more important:—the distinction between the province of logic and the province of the special sciences, as that between general and special; the distinction between natural growth of knowledge, with its natural laws, and the normal procedure whereby grounded knowledge is obtained, with its normal or regulative principles; the distinction between knowledge as a whole and its several parts, immediate and mediate, with restriction of logic to the treatment of all or portion of mediate knowledge; the distinction between the constituents of knowledge as on the one hand given from without (in experience), and on the other hand due to the elaborative action of intellect itself. To one or other of these may be traced the common definitions of logic, and a brief consideration of their contents will be sufficient to show that they severally rest upon more or less

[1] Twesten, *Die Logik, insbesondere die Analytik* (1825), p. 2.

developed general philosophic doctrines, and that their significance for accurate determination of the field of logic depends not so much on what is explicitly stated in them as on what is implied in the general doctrines from which they have taken their rise.

The distinction of logic from the sciences, as dealing in the abstract with that which is concretely exemplified in each of them, is certainly a first step in the process of determination about which there can be little or no doubt. But it is only a step, and progress is not much advanced thereby. For, if the distinction remain vague, it is not sufficient to differentiate logic from many other disciplines, philosophical or philological, and if it be made more precise, the new characteristics will be found to involve some special view as to what constitutes the common feature in the sciences, and to vary with the possible varieties of view. As a rule, too, the added characteristics do not serve by themselves to mark off logical treatment as an independent kind of investigation. They are most frequently obtained by a general survey of scientific procedure. Thus it may be said that in all sciences there are implied clearly defined notions, general statements or judgments, and methodical proofs; logic, therefore, as the theory of the general element in science, will appear as the treatment of notions, judgments, and proofs generally, or in the abstract. If so, then, unless some implied principle further determine the course of procedure, logic would be regarded as a merely descriptive account of the parts making up scientific knowledge, and it would be not only impossible to assign to it an independent position, but hard to discriminate it from psychology, which likewise deals with the parts of knowledge.

If it be understood, however, or explicitely stated, that in

all scientific knowledge there is community of method, resting on common principles or laws of knowledge as such, then clearly not only the province of logic, as now made identical with the treatment of the essence of knowledge, but the special nature of the theorems making up the body of logic, must depend upon the general conception of knowledge with which the thinker starts. In the view of logic taken, *e.g.*, by Mill, the fundamental idea is that of *evidence*, under which must be included all the grounds for any judgment not resting on immediate perception. So far as verbal statement is concerned, the adoption of this as the root idea would not distinguish in any special way the treatment of logical problems resting on it; but in fact each problem is dealt with in accordance with the particular theory of what, from the nature of human knowledge, constitutes evidence. Logic thus involves, or in truth becomes, a theory of knowledge, and in the end, for general spirit and details of doctrine, refers to an ultimate philosophic view. There seems no escape from this conclusion. Start as we may, with popular, current distinctions, no sooner do logical problems present themselves than it becomes apparent that, for adequate treatment of them, reference to the principles of ultimate philosophy is requisite, and logic, as the systematic handling of such problems, ceases to be an independent discipline, and becomes a subordinate special branch of general philosophy.

The attempt to avoid this conclusion must of necessity take form in some discrimination of logic from other varieties which may with it be classed under philosophy in general, and such discrimination is usually effected by laying stress on one or other of the following characteristics.

(1) In the whole process of knowledge, it may be said,

we are able to distinguish and to regard in isolation the methods according to which, from a combination of various elements, cognition of things grows up, and the laws according to which these elements must be ordered, if our subjective consciousness is to represent accurately and faithfully the relations of things. The laws of knowledge—there being understood by knowledge the whole sum of mental determinations in and through which the world of external and internal experience is realised for us—are of two distinct kinds, natural and normal. For the treatment of the natural laws the most appropriate title is psychology; for that of the normal or regulative laws the title logic is peculiarly appropriate. By the one science knowledge is regarded in its relation to the subjective consciousness, as so much of what enters into and constitutes the world of inner experience; by the other knowledge is regarded in its relation to truth, to the objective system, as the means whereby, for theoretical or practical purposes, an orderly and verifiable conception of this system is realised.

A definite place seems thus secured for logic; but, if one may judge merely from the various attempts to expound the body of logical doctrines from this point of view, the characteristic feature is not yet sufficient to determine the boundaries of the science or the specific nature of its problems. In fact, the feature selected might be accepted as the distinguishing mark of logical science by writers who would include under that common title the most diverse matters, and who would differ fundamentally in respect to the treatment of isolated problems. The metaphysical logic of Hegel, the empirical logic of Mill, the formal logic of Kant, might all claim to be developments of this one view of the essence of logic. So wide a divergence is clear evidence that the criterion selected,

though possibly accurate, is not sufficiently specific, and that the interpretation of it, which in truth determines for each the nature and boundaries of the science, depends upon the view taken respecting knowledge as a whole in its relation to the objective order of experience, respecting the import of the so-called normal laws, and respecting the subjective elements supposed to constitute knowledge.

On all sides this particular definition of logic is beset with difficulties, which it cannot afford to dismiss by means of the simple demand that knowledge shall be accepted as somehow given. For, apart altogether from the danger that under so wide a term as knowledge many differences may be accommodated, it then becomes impossible to do more than treat in a quasi-empirical fashion mental facts, the nature and peculiarities of which are to be learned from some external source. In the later, more detailed examination of the view of logic here briefly described, it will be pointed out that the usual formula by which the several logical notions are introduced, viz., that their nature as mental facts is dealt with in psychology, from which logic borrows, is in fact much more than a formula. The logical peculiarities will be found to rest mainly upon the psychological characteristics as borrowed, while it is evident that no substantive, independent existence can be vindicated for a doctrine, the succession of whose parts and their essential nature are given externally.[1]

[1] The following from Drobisch's excellent work (*Neue Darstellung der Logik*, 3rd ed., 1863) will make clear the view commented upon. "Human knowledge is partly immediate, partly mediate. The former rests on given facts, whether of sense-perception or of consciousness, the latter on that which may be deduced by thought from these facts. . . . Thought may be the object of scientific treatment from a double point of view: first, in so far as it is an activity of mind, its conditions and laws may be investigated; second, in so far as it

(2) Some of the perplexities that arise when logic is treated as the theory of the normal laws of knowledge may be obviated by the current distinction between immediate and mediate knowledge. The normal laws of knowledge might be said to apply solely to the process of mediate cognition, and their final aim would be defined as harmony between mediate knowledge and immediate experience. In fact, however, little is gained by the employment of this new characteristic. It is difficult to distinguish with perfect accuracy between the two kinds of knowledge in question; it is impossible that the treatment of the logical problem should not depend entirely on the view taken as to the nature of that which differentiates mediate from

is the instrument for acquiring mediate knowledge, an instrument that may be used not only correctly but also incorrectly, and so may lead to true or to false results. There are therefore natural laws of thought and also normal laws, prescripts, rules, according to which it must be directed in order to lead to truth. The investigation of the natural laws of thought is a problem of psychology; the determination of its normal laws is the problem of logic. . . . The logical normal laws of thought are not to be discovered by mere observation, for it would then be impossible to decide whether the mode in which we ordinarily think is also valid; but they must themselves be proved by thought, and so be shown to be necessary, not capable of being other than they are. The warrant for both the thought that proves these laws and the laws proved by it, is to be found in the thorough harmony between the two. Logic thus presents itself as in no way a mere description and analysis of thought, a descriptive science, but as a demonstrative science" (§§ 1, 2, 3). So far, there is little to object to; but clearly the whole character of the science depends (1) on the significance to be attached to the fundamental term *thought*, and (2) on the limitations imposed on the conception of laws. It becomes necessary, then, for Drobisch, as for any logician, to define his point of view regarding thought; and the definition (§§ 4, 5) at once introduces the further discrimination of form and matter, a discrimination which determines the whole treatment of the forms of logical problems.

immediate knowledge. Whether we express this as thought or as belief, its nature then becomes the all-important factor in determining the course of logical treatment, and further progress will manifest divergencies according as stress is laid on the subjective characteristics of thought, the laws to which, from its essential nature, all its products must conform, or on the limitations imposed by principles which have reference to the most general relations of the things thought about. In the one case a formal logic, of the type commonly known as the Kantian, would be developed; in the other either an empirical logic, like that of Mill, wherein the nature of notions, propositions, and reasonings is considered from the point of view of the empirical conception of experience, or a transcendental logic, like that involved in the *Critique of Pure Reason*, or a metaphysical logic, like that of Hegel, or a mixed doctrine, like that of Trendelenburg, Lotze, and Ueberweg. In short, the general philosophic view of thought is that upon which the character of logic as a science rests.

(3) There has above appeared, incidentally, one of the most current methods of solving the logical problem, by procedure from the distinction between that which is given to the mind in knowledge, and that which is supplied by the mind itself. No distinction seems more simple; none is in reality more complex. The opposition on which, in its popular acceptation, it rests is that between the individual concrete thinking subject and the world of objective facts, existing, as it were, to be cognised. The full significance of such an opposition, the forms in which it presents itself in conscious experience, the qualifications which must be introduced into the statement of it that it may have even a semblance of reality,—these are problems not solved by

a simple reference to the distinction as existing. It may well be held that knowledge is, for the individual, the mode (or one of the modes) in which his relation to the universe of fact is subjectively seized, but it is not therefore rendered possible to effect an accurate and mechanical separation of knowledge into its matter and form. Even on lower grounds it may be held that by the employment of this criterion little or no light is thrown upon the logical question. For no determination is supplied by it of the universal characteristic of form as opposed to matter in knowledge, and a comparison of various expositions will show the most startling diversity of view respecting the nature and boundaries of the formal element in knowledge.

It is of course true that in one sense any scientific treatment of knowledge is formal. Our analysis extends only to the general or abstract aspect of cognition, not to its actual details. But we are not, on that account, dealing with the form of knowledge. So soon as it is attempted to define more accurately what shall be understood by form, then it is found that various views of logic arise, corresponding to the variety of principles supposed to be applied in the treatment of form. Thus the stricter followers of the Kantian logical idea, *e.g.*, Mansel and Spalding, recognise, as sole principles which can be said to be involved universally in the action of thought, the laws of identity, non-contradiction, and excluded middle,[1] and in their hands logic becomes merely the systematic statement of these laws, and the exposition of the conditions which they impose upon notions, judgments, and reasonings. Analytical

[1] "Logic," says Spalding (*Ency. Brit.*, 8th edition), "is the regulative theory of explicative thought"; "Logic," says Mansel (*Prolegomena Logica*, 2nd ed., p. 264), "is the science of the laws and products of pure or formal thinking."

consistency, *i.e.*, absence of contradiction, is on this view the one aspect of knowledge which is susceptible of logical treatment. On the other hand, the idea of a contribution furnished by the mind itself to knowledge may lead to a more concrete and yet not less exact system of the forms of knowledge, if there be taken into account the real character of the operation by which such contribution is made. Thus in the logic of Ulrici, from the view of thought as essentially the distinguishing faculty, by which definiteness is given to the elements entering into knowledge, there follows not simply an iteration of the principle that thought must not contradict itself, but a systematic evolution of the fundamental relations involved in the action of thought, in which the more specifically logical products, the notion, judgment, and reasoning, have a determinate place assigned to them.

Not only, then, may quite distinct provinces be assigned to logic by thinkers who start with the same idea of thought as contributing to knowledge, but, as may well be imagined, the treatment of special logical problems presents a most bewildering variety. The nature of judgment, the principle of reasoning, the characteristics of thought which is in accordance with logical rule, will be viewed differently according to the special interpretation put upon the functions of the subjective factor in knowledge. Here again we find that the really influential fact in the determination of the province and method of logical science is a general philosophic conception of knowledge or thought.[1]

[1] In Rosenkranz, *Die Modificationen der Logik abgeleitet aus dem Begriff des Denkens* (1846), a similar conclusion is illustrated by an elaborate classification of possible modifications of the view of logic. Compare also Braniss, *Die Logik in ihrem Verhältniss zur Philosophie geschichtlich betrachtet* (1823).

4. Although, then, it does not seem practicable to obtain, either by external division or by internal analysis, a clear and sufficient definition of the province and function of logic, there remains yet one method by means of which the desired end may be attained. It may be that the separation of logic from other philosophic disciplines has come about historically, and that the assignment to logic of a special body of problems and a special kind of treatment is due to the accidents of its development. We might therefore hope to gain from a comparative survey of the field of logic, as that has been historically marked out, some definite view not only respecting the specific problems of logical theory, but also regarding the grounds for the isolated treatment of them. That in the history of logic there should be found a certain continuity of doctrine and development may, however, be compatible with entire absence of a common body of received logical matter, and the result of an historical research may be little more than a statement of distinct conceptions regarding the nature and province of the science, leading to the inclusion of very distinct materials within its scope. It requires but a superficial investigation of that which at various intervals has presented itself as logical theory to arrive at the conclusion that the differences in general spirit and in the mass of details far outbalance any agreement as to a few detached doctrines and technical symbols.

If the survey were limited even to the period preceding the attempts at radical reformation of philosophy in general, and of logic as included therein, to the period in which the Aristotelian doctrines, as they may be called, formed the common basis of logical treatment, we should be able to detect differences of such a kind as to indicate radically distinct fundamental views. The scholastic logic, which,

even by itself, cannot be regarded as one theory with unimportant modifications, is most falsely described as Aristotelian. The technical terminology, the general idea and plan, and some of the formal details are certainly due to the Aristotelian analysis of reasoned knowledge; but in spirit, in ruling principles, and in the mass of details the method of the scholastic logic is alien to that of Aristotle. It will be shown later that the Aristotelian analysis is saturated with the notions and aims of the Aristotelian metaphysics and general theory of knowledge, and that on that account alone, apart from the introduction of many foreign ingredients, from Stoic, Arab, and Byzantine sources, into the scholastic system, an important difference must subsist between the original doctrine and that which presents itself as but its historical development.

Even more radical is the divergence of modern logic from the Aristotelian ideal and method. The thinker who claimed for logic a special pre-eminence among sciences because "since Aristotle it has not had to retrace a single step, . . . and to the present day has not been able to make one step in advance,"[1] has, himself in his general modification of all philosophy, placed logic on so new a basis that the only point of connection retained by it in his system with the Aristotelian may be not unfairly described as the community of subject. Both deal in some way with the principles and methods of human thinking, but as their general views of the constitution of thought are diverse, little agreement is to be found in the special treatment of its logical aspect. So when a later writer prefaces his examination of logical principles with the declaration that "logic is common ground on which the partisans of Hartley and of Reid, of Locke and of Kant, may meet and join

[1] Kant, *Kritik* (ed. Hartenstein), Vorrede, p. 13.

hands,"[1] we are not unprepared for the result that, with a few unimportant exceptions, his views of logical principle coincide with those of no recognised predecessor in the same field, diverge widely from either the currently received or the genuine Aristotelian doctrines, and lead to a totally new distribution, in mass and detail, of the body of logical theorems and discussions.

Such divergence is, indeed, most intelligible. If one reflects on the significance which would be attached in any one of these logical systems, of Aristotle, of Kant, of Mill, to the *universal* or universalising element of thought, and on the fact that such universal must manifest itself as the characteristic feature in all the important products of thinking, the notion, the judgment, the syllogism, the conclusion is inevitable that difference of view in respect to the essence must make itself felt in difference of treatment of details. The ultimate aim of proof, and the general nature of the methods of proof, must appear differently according as the accepted ground is the Aristotelian conception of nature and thought, the Kantian theory of cognition, or subjective empiricism.

If, adopting a simpler method, one were to inspect a fair proportion of the more extensive recent works on logic, the conclusion drawn would be probably the same,—that, while the matters treated show a slight similarity, no more than would naturally result from the fact that thought is the subject analysed, the diversity in mode of treatment is so great that it would be impossible to select by comparison and criticism a certain body of theorems and methods, and assign to them the title of logic. That such works as those of Trendelenburg, Ueberweg, Ulrici, Lotze, Sigwart, Wundt, Bergmann, Schuppe, De Morgan, Boole, Jevons

[1] Mill, *System of Logic*, i. p. 13.

(and these are but a selection from the most recent), treat of notions, judgments, and methods of reasoning, gives to them indeed a certain common character; but what other feature do they possess in common? In tone, in method, in aim, in fundamental principles, in extent of field, they diverge so widely as to appear, not so many different expositions of the same science, but so many different sciences. In short, looking to the chaotic state of logical text-books at the present time, one would be inclined to say that there does not exist anywhere a recognised, currently received body of speculations to which the title logic can be unambiguously assigned, and that we must therefore resign the hope of attaining by any empirical consideration of the received doctrine a precise determination of the nature and limits of logical theory.

5. In order to make clear the reasons for this astonishing diversity of opinion regarding the province and method of logic, and so make some advance towards a solution of what may well be called the logical problem, it seems necessary to consider some of the leading conceptions of logic, with such reference to details as will suffice to show how difference of fundamental view determines the treatment of special logical problems. In this consideration the order must be historical rather than systematic. Not, indeed, that it is needful, nor is it proposed, to present an historical account of philosophy at large, or even of logic in particular; our purpose is merely to disentangle and bring clearly forward the nature of the principles respecting logical theory which have served as basis for the most characteristic logical systems. Such an inquiry will not only assist in explaining the divergencies of logical systems, but throw light upon the essence of logic itself. Thus, for example,

a critical comparison of the Aristotelian and Kantian or Hegelian conceptions of the end, aim, and function of logic may be expected to bring forward in their most abstract form opposed, or at least varied, views of the nature of the subject, and to enable a well-balanced judgment to be obtained on the problem involved.[1]

In this historico-critical survey, the first section must naturally be devoted to a consideration of the Aristotelian logic. If it were intended to present a complete history, or abstract of a complete history of logic, it would doubtless be necessary to preface the treatment of that from which logic, as we know it, has taken its rise, by a notice of such speculations of a logical character as are to be discovered among Oriental systems. But, however interesting such an historic research might be, its results would have little or no bearing upon the special problems before us. Our notions regarding logic are affected by the Aristotelian analysis of the method of reasoning, and by such systems as have been developed therefrom, but have been modified, and are likely to be modified, in no way by any Oriental systems of a like kind. The records of Oriental attempts at analysis of the procedure of thought are of purely historic value, and may, for our present purpose, be disregarded.[2]

[1] For a notice of works on the history of logic, see note A, p. 164.

[2] For a notice of some of the more developed systems of Oriental logic, see note B, p. 165.

II

THE ARISTOTELIAN LOGIC

6. In a remarkable passage at the close of the tract called by us the *Sophistical Refutations*, Aristotle claims for himself distinct originality in the conception of subjecting to analysis the forms or types of argument. Something had been achieved in closely allied matters, in the analysis of rhetorical methods and grammatical forms; but, in the attempt to generalise and reduce to order and method the very substance of reasoning, nothing, according to this statement, had been effected, nor had the possibility of such reduction been seriously contemplated. "The system I have expounded had not been partially, though imperfectly, elaborated by others; its very foundations had to be laid. . . . The teachers of rhetoric inherited many principles that had long been ascertained; dialectic had absolutely no traditional doctrines. Our researches were long, tentative, and troublesome. If, then, starting from nothing, it bears a comparison with others that have been developed by division of labour in successive generations, candid criticism will be readier to commend it for the degree of completeness to which it has attained than to find fault with it for falling short of perfection."[1]

[1] The above translation, which is somewhat free, is taken from Mr Poste's edition of the *Sophistici Elenchi*, p. 95.

Although the specific reference in this passage is to the analysis of dialectical argument contained in the *Topica*, the same claim might with justice have been made in regard to the more extensive analysis of the forms of reasoning in general which makes up the substance of the other books of the *Organon*. There had been, prior to Aristotle, much discussion of problems that would under any view be included under the head of logic; but no systematic attempt had been made to analyse knowledge as a whole in its formal aspect, to throw under general heads or classes the types of reasoning, whether dialectical or scientific, and to exhibit the general relations in which the elements of all reasoning stand to one another. After Aristotle, it became possible to refer all such discussions to a common head, and to view them as component parts of one systematic doctrine. In a peculiar sense, then, Aristotle may be described as the founder of logical science.

The precise nature of the inquiries falling within the scope of the Aristotelian logic may receive some preliminary explanation supplementary to that which can only be given by a careful study of the chief theorems of the system, if there be taken into account (*a*) the advances towards a theory of logical method contained in the speculations of earlier Greek thinkers, (*b*) the classification of philosophic disciplines, which underlies the body of Aristotle's writings, and (*c*) the general conception of the matter of logical analysis which may be deduced from any special or incidental treatment of the question in Aristotle. Of these in order.

(a) *Logical discussions prior to Aristotle.*

7. The inquiries which find a place in the Aristotelian logic are all, in a large sense, problems of the theory of know-

ledge. They arise, therefore, only in connection with critical reflection on the nature, grounds, and method of knowledge. The earliest forms of Greek speculation, turning rather upon explanation of natural fact, being in essence attempts to reduce the multiplicity of known fact to unity of principle, contain, as a consequence, problems of a metaphysical character, which might involve problems of strictly logical character, but were logical only in potentiality. The difficulties with which the early Greek speculators were presented had at first an aspect which was metaphysical only. Not until these difficulties were transferred into the sphere of thought, with the consciousness, however undeveloped, of a possible opposition between the determination of things reached by immediate processes of thinking and the characteristics of thought when submitted to critical reflection, could problems of a distinctly logical character come forward for solution. Of all these metaphysical questions the most important centre round the fundamental opposition between unity of principle and multiplicity of fact, between the one and the many, an opposition which under varied forms presents itself at every stage in the history of philosophic speculation. It is, indeed, an abstract expression for the problem with which philosophy at all times has to deal, though, naturally, the formulæ under which it makes its appearance are determined by the more or less developed conceptions of the elements entering into it that may have been attained.

In the first period of Greek speculation, the problem presented itself in its simplest, most direct aspect, and, after a few rough attempts at a quasi-physical explanation of the genesis of many out of one, there come forward, as reasoned, ultimate solutions, the Eleatic doctrine that only

unity has real being, the Heraclitic counter-doctrine that only in change, in the many, is truth to be found, and the Pythagorean notion of number, harmony, as containing *in abstracto* the union of the opposites, one and many. No one of these philosophic treatments can be said to contain specifically logical elements, but they raise questions of a logical kind, and, especially in the records of the Eleatic views, one can trace a close approximation to the critical reflection which marks the transition to a new order of ideas. Results which in these systems are stated with metaphysical reference only, reappear with new aspect among the Sophists and the Socratic schools.

The transition stage, indeed, partly aided by the atomic separation of objective fact from subjective sense experience, is mainly the effect of the Sophistic and Socratic teaching. Socrates and the Sophists have this in common that both treat the fundamental problem of philosophy as it had been handed down with special reference to the subjective experience of the individual. In their conceptions of the nature of subjective experience they differ widely from one another, just as in aim, method, and principles both differ from modern views on the same question ; but in both is to be discovered the critical reflection on thought and its essence which marked a new stage of speculation and prepared the way for a fresh development of philosophical activity.[1] A brief indication of the logical

[1] It is an error to strain expressions which, with due qualifications, may be accepted as valuable. One meets repeatedly with the assertion that the characteristic difference between ancient and modern philosophy is that in the former the special problem of the theory of knowledge, the possibility of reconciling subjective thought with objective system of things, was not contemplated. In a certain sense this is true ; but, taken absolutely, it is both erroneous and misleading. The Sophistic discussions, the Socratic theory of the notion, the

elements involved in this new treatment of the problem will be sufficient. In the teaching of the Sophists generally is to be discerned the opposition between subjective reflection and objective fact; in that of Protagoras and Gorgias in particular there appear as problems of the theory of knowledge difficulties for the older metaphysic of Heraclitus and the Eleatics respectively. The Heraclitean principle of change is the general foundation for the doctrine that the momentary perception is the only fact of cognition, and upon it may be based the conclusions that all truth is relative to the individual state of the individual subject, and that judgment, as a mode of expressing truth, is a contradiction in itself.[1] Thus the extreme Heracliteans, as Cratylus, rejected the proposition or combination of words, as expressing a unity and permanence not to be found in things, and reduced speech to the symbolism of pointing with the finger. Less developed but not less clear is the connection between the brief sceptical theses of Gorgias and the Eleatic doctrine of unity. As knowledge was impossible on the Heraclitean view, since it implied a synthesis not discoverable amidst incessant change, so for Gorgias knowledge was impossible, since in the synthesis was

Platonic distinctions of reason, understanding, and opinion, the Aristotelian treatment of the principles of knowledge, of the universal, and of the opposition between science and opinion, are quite unintelligible except under supposition of some such distinction. The difference is not in the problem, but in the new conceptions of the nature of the elements, and of the method of solution which modern philosophy introduces into its discussion.

[1] However we may interpret the Protagorean maxim in relation to more modern conceptions, there appears no reason to doubt the historic accuracy of the connection indicated in the *Theætetus*, and in the fourth book of the *Metaphysics*, between the Heraclitean metaphysic and the Protagorean theory of knowledge.

involved an element of difference, multiplicity, not reconcilable with the all-embracing unity of things.

It is evident from the treatment of such views in Plato and in Aristotle, how many of the illustrations used in support of the general thesis depended for their apparent strength on neglect of some of the elementary conditions of thought, and how inevitably reflection upon these difficulties led to the construction of a theory of thought. The first outlines of such a theory are to be found in the Socratic principle of the notion (or concept, as we may call it, for the notion as viewed by Socrates is certainly the concrete class notion, the simple result of generalisation and abstraction), and to Socrates is assigned by Aristotle the first statement of two important logical processes—induction, or the collection of particulars from which by critical comparison a generalised result might be drawn, and definition, or the explicit statement of the general elements disclosed by critical comparison of instances.[1] In the Socratic teaching, so far as records go, no explicit reference was made to the problems in connection with which those processes are of greatest significance, but in the lesser Socratic schools on the one hand, and in Plato on the other, we find the new principle either brought to bear upon the old difficulties, or developed into a comprehensive method.

The Socratic concept contains in itself the union of one and many, but it is in nature subjective; it is a mode of knowledge. If, then, it be regarded as only subjective, the old difficulties reappear. How is it possible to reconcile, even in thought, an opposition so fundamental as that between unity and plurality? Must there not be a like irreconcilable opposition between the subjective counter-

[1] *Metaph.*, 1078b 27-29.

parts of these objective relations, between the individual notion, the atom of knowledge, and the proposition or definition? How, indeed, can there be a combination in thought of that which is in essence uncombinable? Whether we take Aristippus, who draws mainly for theory of knowledge on the Heraclitean-Protagorean sources, or Antisthenes, who leans towards the Eleatic, or the Megarians, who also, in accordance with the Eleatic thoughts, devoted chief attention to the polemical aspect of the theory, we find a set of problems appearing, the solution of which imperatively called for a theory of knowledge as the combination of one and many.

Perhaps the most interesting of these early thinkers, so far as the history of logic is concerned, is Antisthenes, whose extreme nominalism presents the most curious analogies to some recent logical work.[1] According to Antisthenes, the world of cognisable fact consists of combinations of elementary parts (πρῶτα). These πρῶτα appear in cognition as irreducible elements denoted by the simplest elements of speech, names. The name is the mark for the sense-impression by which each πρῶτον is communicated to us, for they are only known by sense, and are strictly individual. A composite thing is known through the combination of names of its parts, and such a combination (συμπλοκή) is a proposition or definition (λόγος). Each thing has its specific λόγος (οἰκεῖος λόγος), and a judgment is merely the expression of this. There is therefore no distinction of subject and predicate possible; even identical propositions, the only

[1] On Antisthenes, see the third part of the *Theætetus*, which appears, beyond doubt, to refer to him (comp. Peipers, *Untersuchungen über das Systems Plato's*, 1874, pp. 124-48), and Aristotle, *Metaphysica*, 1024b 32, 1043b 24; *Topica*, 104b 21.

possible forms under this theory, are mere repetitions of the complex name. Predication is either impossible or reduces itself to naming in the predicate what is named in the subject. It is the simple result of so consistent a nominalism that all truth is arbitrary or relative; there is no possibility of contradiction, not even of one's self.

The theory of Antisthenes, strange as it may at first sight appear, rested on certain metaphysical difficulties, which lie at the root of all the perplexity regarding the import of propositions, and it is not too much to say that these difficulties were kept continually in mind by Plato and Aristotle in their several attempts to explain the nature of knowledge. Both thinkers bring forward, from various fields, new elements which enter into the consideration of the problem, but both find themselves confronted with the ultimate question, What is the ground of unity in things known, and in what way does thought unite the detached attributes of things into a subjective whole? What is the nature of the unity which binds things, themselves in a sense units, into classes or wholes, and how comes it that in the judgment subject and predicate are, in a sense, set at one? The inquiry branches off in varied directions, into discussions on the universal and particular, on form and matter, on the unity of the definition, but nevertheless remains the one underlying difficulty for both thinkers.

In Plato, for whom the solution was found in the participation in or imitation of ideas by things, we find more distinctly conceived the series of logical processes involved obscurely in the Socratic method. So far as positive statements regarding the ideas can carry one, it may be said that in essence these processes concern only

the formation of or deduction from the concrete universal concept or general notion. The ideas, in the Platonic system, at least in reference to the thought which apprehends them, resemble most closely class notions. A deeper significance often appears to attach to the relative processes of *induction*, whereby the resemblances of things, the idea in them, is disclosed, *definition*, whereby the content of the idea is made explicit, and *division*, whereby the external connection of ideas with one another, their system, is deduced; but such significance attaches to the more purely metaphysical aspects of the theory, and had no particular bearing on the Aristotelian treatment of the same problems. Not much is given in Plato towards a theory of the proposition, though sometimes an analysis of its elements is sketched; and the method of division could yield only a few of the types of deductive reasoning.

But, over and above these more definite contributions towards the construction of a theory of knowledge, there are general aspects of the Platonic work of not secondary importance for the Aristotelian logic. In Plato the fundamental differences of earlier philosophic views appear in a new phase, and are elevated to a higher stage. Sophistic method is analysed, not as in forms actually existing, but in its essential features, and the opposition between sophist and philosopher is viewed as the opposition between opinion and knowledge. Heraclitean principle of change and Eleatic doctrine of unity are resolved into the more comprehensive opposition of the universal and the particular, while hints of an ultimate solution, of a universal which is at once and *per se* particular, are not wanting. The Socratic method of thought appears as that by which alone a solution of philosophic difficulties is to

be obtained, and the consideration of thought in its relation to facts is marked out for special investigation. A deeper view of thought was thus made at once possible and necessary.

(b) *Classification of Philosophic Disciplines.*

8. Much, then, had been effected by Aristotle's predecessors in the way of preparing a definite body of problems and a method of dealing with them, problems and method which might fairly be said to belong to a theory of knowledge as such; and, from the occasional references in the *Organon* to opinions of contemporaries, it is evident that many isolated attempts at solution of such questions were being carried on. In Aristotle we find a systematic examination of many of these problems, but it is left by him doubtful what place in the general scheme of philosophic sciences should be assigned to it. The distribution into physics, mathematics, and first philosophy, or the wider classification of doctrines as poetic, practical, or theoretical, in no way enables us to class logic or the body of speculations making up the *Organon*. That the forms of proof analysed in these writings are of universal scope is unambiguously declared; that the first principles assumed in all proof are dealt with in first philosophy is also made clear; but the relations between the two doctrines so reciprocally related cannot be determined from any statement made by Aristotle himself. That he should have regarded the inquiries of the analytics as propædeutic in character, and should have held that those who assume to discuss problems of first philosophy ought to have made themselves acquainted with the general theory of proof, is

intelligible; and more than this significance cannot, we think, be assigned to the passage in the *Metaphysics*, on the ground of which the logical inquiries have been classed as the general, common introduction to the whole system.[1] For the close connection between the analytical researches of the *Organon* and the inquiry into essence or being as such forbids us to accept, in any strict sense, a separation of these as forming distinct and independent sciences. To metaphysics is assigned the consideration of the principles of proof, and the kind of inquiry making up first philosophy is described by Aristotle in a fashion which assimilates it most closely to the researches of the analytics. That which is left undecided by the Aristotelian classification is the relation of the logical inquiries to the organic whole of which first philosophy is the main or sole part.[2] To obtain any fresh light we must turn to the consideration of indications supplied by Aristotle as to the nature of the inquiries grouped under the head of *Analytics*.

(c) *General conception of the matter of Logical Analysis.*

9. Such indications are unfortunately most scanty. As we probably have not the *Metaphysics* in its full extent, actual or contemplated, the want of a clear separation between the inquiries belonging specially to first philosophy and those appropriate to the analytical

[1] *Metaph.*, iv. 1005b 2. See Zeller, *Ph. d. Gr.*, ii. 2 (3rd ed.), p. 184, *n.*; Rassow, *De Definit. Not.*, 46, 47; Schwegler, *Comment. zur Metaph.*, iii. 161; and, *contra*, Prantl, *Gesch. der Logik.*, i. 137. Zeller maintains the view that Aristotle intends to indicate the place occupied by the analytics in his general scheme of philosophy.

[2] On Aristotle's use of the term λογικός and its allies, see (in addition to Waitz, *Com. in Organ.*, ii. pp. 353-55) Schwegler, *Commentar zu Ar. Metaph.*, vol. iv. pp. 48-51.

researches may be due in part to the deficiency of our materials. There are, however, two lines of separation discernible, from which some useful inferences may be drawn. What we call the logic of Aristotle, *i.e.*, the treatises making up the *Organon*, is roughly divisible into three parts: (1) The formal analysis of syllogism and its allied types of reasoning, with the more particular discussion of the elementary parts of reasoning = the proposition; (2) the theory of scientific proof and definition (apodictic); (3) the theory of probable arguments, or of reasoning based on currently received opinions and leading to conclusions more or less probable (dialectic). Certainly for Aristotle there was no such distinction between the first and the remaining two parts as would in any way correspond to the modern separation of general or formal logic from the theory of knowledge, or material logic; the three parts in conjunction make up one body of doctrine. Now dialectic is very specially indicated as being of a formal character, *i.e.*, as dealing with no special matter, but with κοινά, opinions, or types of opinions common to all sciences.[1] Apodictic, we may assume, is in like manner the formal study of what constitutes knowledge strictly so called, the nature of the principles on which knowledge rests, the special marks distinguishing it, and the method by which knowledge is framed.

But in every body of doctrine we may distinguish, according to Aristotle, three things:—the genus or class of objects with which the demonstration is concerned; the essential or fundamental attributes, qualities of these objects, which are to be demonstrated of them; and, thirdly, certain common axioms or principles of demon-

[1] See *Anal. Post.*, i. 11; *Rhet.*, i. 1, and in many passages. *Cf.* Heyder, *Method. d. Arist.*, p. 348.

stration, not themselves demonstrable, and not entering as integral parts into the demonstration, but lying in the background as security for the reasoning carried out by thought employing them. Can anything corresponding to these three facts be discovered, if we assume for the moment, what certainly is not explicitly stated by Aristotle, that analytic constitutes a special body of doctrine? The genus or class about which the doctrine is concerned can only be reasoning itself, either as apodictic or as dialectic, and the latter for a special reason may be left out of account; ἀπόδειξις, then, is the matter concerning which the doctrine is put forward. But ἀπόδειξις is a form of knowledge, that is to say, is subjective. The properties, therefore, of apodictic science can only be made clear if we consider on the one hand the objective counterparts of necessity and universality in thought, and on the other hand the nature of universality and necessity of thought itself. The common principles or axioms, finally, can only be such presuppositions as are made in apodictic or reasoning generally respecting thought in its relation to fact, as grasping or apprehending reality. The consideration of such axioms, it has been already seen, pertains to first philosophy. Analytics then would appear as an independent doctrine, holding of first philosophy on the one hand, both in regard of the common axioms and in regard of the attributes of being, by which it is a possible object of science, and on the other hand referring to the subjective treatment of thought, whether in relation to principles or to fact generally.

A very similar result may be attained if we follow out a line of distinction indicated in more than one portion of the *Metaphysics*.[1] Separating the modes in which

[1] *Metaph.*, vi. 4, v. 29, ix. 10. *Cf.* Schwegler, *Com.*, iii. 241, iv. 29 *sq.*, 186; and Brentano, *Bedeutung des Seienden nach Arist.*, 21 *sq.*

being is spoken of into four—(1) *τὸ ὂν κατὰ συμβεβηκός*; (2) *τὸ ὂν ὡς ἀληθὲς καὶ τὸ μὴ ὂν ὡς τὸ ψεῦδος*; (3) *τὸ ὂν κατὰ τὰ σχήματα τῆς κατηγορίας*; (4) *τὸ ὂν δυνάμει καὶ ἐνεργείᾳ*—Aristotle excludes the second from the special researches peculiar to first philosophy, the study of being as being, but neither excludes it from general consideration in metaphysics as a whole, nor handles it at length, deferring it rather for more detailed treatment. A comparatively clear account, however, of what is understood by him under the head of being as truth and non-being as falsity may be extracted from the various passages referred to, and little doubt can remain that being so regarded is in a peculiar sense the matter of analytical (*i.e.*, logical) researches.

Being as truth and non-being as falsity refer to and rest upon combination and division of the elementary parts of thought. For truth and falsity have no significance when applied to things, but only to the connection of thought which is dominated by the one principle of non-contradiction. Nay, thinking has not even immediate and direct reference to being as such, but only to being as the existent, as qualified, or quantified, or modified in some other way (*i.e.*, according to the categories), and it is in its very essence the conjunction or unifying of elements. What cannot be conjoined, as, *e.g.*, the notions of elementary facts themselves, are not either true or false, and are not matters of thought. Thought thus moves in a definite sphere, that of the combinable or separable, the correspondence of conceptions with real relations, and has its limits on the one hand in the elementary data apprehended by intellect (*νοῦς* = reason), and on the other hand in the infinite sea of particular, accidental qualifications of things (*συμβεβηκότα*). The possibility of contradictory assertions (for true and false judgments together

make up the contradiction, τὸ δὲ σύνολον περὶ μερισμὸν ἀντιφάσεως) is the distinguishing mark of thought.

Now it is this very possibility that lies at the root of all the analytical researches. Not, indeed, that one can assume for Aristotle a view which has appeared in later logical works, that all forms of logical reasoning are to be deduced from the principle of contradiction. Quite the reverse. The common axioms underlie all processes of proof, direct or indirect, but they do not enter into or form part of proof. Nothing can be deduced from them; but their authority can be appealed to against any one who refuses to allow a conclusion reached by a correct syllogism from true premisses.[1] (The nerve of logical proof would thus lie in the disjunctive proposition; either this conclusion is to be granted, or the principle of contradiction is denied.) Now the analytical researches are in especial the treatment of combination and separation in thought. For even the syllogism may be regarded as only a complex judgment or synthesis, and in the exposition of the forms of combination and separation we shall find a complete system extending from the unproved principles and exhibiting the methods according to which thought proceeds towards the determination of the essential properties of things or the discrimination of various heads under which the transitory and accidental attributes may be advantageously classed.

So far then as one can judge, the matter of Aristotle's analytical researches may be expressed as the concrete nature of thought, characterised by its fundamental attribute, the possibility of contradiction, correlated with the real system of things, and having as its end the realisation of systematic knowledge, *i.e.*, the adequate subjective in-

[1] *Cf.* generally *Anal. Post.*, i. 14.

terpetation of being. No further explanation can be obtained without entering in some detail on the actual processes included under the title which has here been somewhat arbitrarily assigned, namely, the concrete nature of thought. At the close of this survey one may be in a position to resume with fuller knowledge the definition here given. For its significance depends entirely on the meaning which in Aristotle belongs to the terms thought and being.

10. This preliminary survey, though sufficient to enable us to fix approximately the position of the analytic researches in the total scheme of sciences, has not thrown an entirely clear light on the principle of the Aristotelian logic. For, as has just been said, the indication that the analytics have to do with being as conceived by thought, conducted under the general axiom of non-contradiction and expressed in language, requires to be filled up by a more detailed treatment of the Aristotelian theory of thought in relation to being. Upon the characteristics assigned to thought or knowledge in this special relation, must depend the general nature of the Aristotelian logic, the determination of the scope of logical treatment, and the essence of logical method. For, from a quite similar statement regarding the province within which logic moves, totally diverse conclusions might be drawn respecting the precise function of logical method. One might have either a formal doctrine or *technic*, or a real methodology: either an attempt to evolve logical principles from the axiom of contradiction, or a development of the laws according to which thought, necessarily acting under the said axiom, proceeds towards the construction of knowledge. The history of logic clearly shows how differently the matter of the analytics may be viewed.

For one of the possible conclusions, that logic is a technical or quasi-mathematical exposition of formal relations, has been accepted as the undoubted result of Aristotle's teaching, and has so prevailed as to make itself the current conception.[1] The other, the view of logic as theory of the method of scientific thought, has been cast entirely into the background, so far as logical doctrines are concerned, and, if allowed at all, has been regarded as foundation for a species of applied logic, an appendix to the other.

11. Not much aid is afforded directly by any classification or division of the books now collected together as the *Organon*. As above noted, the *Prior* and *Posterior Analytics* with the *Topics* form one connected whole, while the *Categories* and the *De Interpretatione* stand apart as isolated treatments of special problems, not organically or necessarily part of the research. The genuineness of both these treatises has been doubted, and there is, indeed, much to make one pause in admitting them to a place in the *corpus* of the Aristotelian works. The tract entitled *Categories* neither refers to, nor is referred to in, any other of Aristotle's undoubted writings; and, though the extreme opposition supposed to exist between its teaching in regard to first and second essences and the teaching of the *Metaphysics* rests on no solid foundation, the mode of expression and the general treatment have in them something strange and foreign. It is most remarkable, if the tract be Aristotle's, that no cross reference should be found between the treatment there given of fundamental notions like quantity, quality, and relation, not to speak of substance (*οὐσία*), and the book of definitions

[1] *Cf.* Brandis, *Gr.-röm. Phil.*, ii. 373-75.

contained in the *Metaphysics* (Book Δ). The concluding chapters are generally regarded as spurious, and we shall probably not be wrong in viewing the whole as a redaction of Aristotelian material rather than as a formal treatment by Aristotle himself.[1] The *De Interpretatione* has somewhat stronger external evidence in its favour, for, though it is not referred to in any work of Aristotle's, it seems to refer unambiguously to the *Analytics* and *Topics*, and vaguely to the *De Anima*.[2] Nevertheless there is this to be said, that references are not in such a case conclusive, that the structure of the book is unwieldy and clumsy, not such a treatment of the proposition as one would expect from Aristotle *after* the *Analytics*, and that in one or two points, in the classification of judgments according to quantity, and in the way of regarding modals, the teaching is not in perfect harmony with that of the *Analytics*.[3] One would not probably be far wrong in concluding here, as in the case of the *Categories*, that the work is a redaction, perhaps drawing from other lost writings of Aristotle, perhaps based on oral teaching, by some Aristotelian scholar.

In the *Analytics* the aim is defined to be the examination

[1] Internal evidence, if worth anything, is strongly against Zeller's view that the book is not only genuine, but an early work (*Ph. d. Gr.*, ii. 2, 69).

[2] See Bonitz, *Index Arist.*, *s.v.* "Aristoteles"; Zeller, *Ph. d. Gr.*, ii. 2, p. 71. The vagueness of the reference to the *De Anima*, which, indeed, cannot be verified, led Andronicus to reject the *De Interpretatione*.

[3] The differing ways in which universality in a proposition are explained in the *De Inter.* and the *Analytics* is deserving of attention, as also the absence from the *Analytics* of the peculiar designation ἀόριστον as applied to negative terms—nouns or verbs. All that is essential in the treatment of these negatives is given, however, in *Anal. Pr.*, i. 46.

of apodictic or scientific proof; but the examination of the elements of syllogism is first undertaken, since in all demonstrative science syllogism is employed, while, on the other hand, syllogism may present itself in dialectic matters. The first book of the *Prior Analytics*,[1] after a brief statement of the nature of the proposition and of the fundamental law of predication, proceeds to analyse (1) the various kinds, figures, or modes of syllogism; (2) the means by which syllogisms are formed; (3) the reduction of various imperfect forms of argument to the perfect syllogistic type. The unity of the book is unmistakable, and the plan is indicated in more than one place by Aristotle himself. The second book, on the contrary, has little or no unity, and is loosely connected with the first.[2] It consists of a series of detached tracts, dealing with the theory afterwards called that of *Consequence*, with circular reasoning, with the possibility and consequences of syllogism formed by converting parts of the original argument, with certain modes of indirect argument and fallacy, and concluding with brief handling of induction, paradigm, enthymeme, argument from signs, probabilities, &c.

The *Posterior Analytics*, much less perfect in form than the first book of the *Prior Analytics*, contains the Aristotelian theory of ἀπόδειξις or demonstrative science, and in its first book deals with the general nature of demonstration, the grounds on which it rests, its form, and its essential significance. The second book contains the theory of definition in its relation to demonstration, and falls into three portions — the first, raising difficulties or questions regarding the nature and possibility of

[1] Which is sometimes referred to explicitly as περὶ συλλογισμοῦ.

[2] The references to what has been accomplished, indeed, seem to point to some other treatment than that in the first book.

definition; the second, grounding definition, as the final result of knowledge, on the process of demonstration; and the third, in a single chapter, investigating the method by which the first principles of ἀπόδειξις are known. The book requires much supplement from the similar treatment in the *Metaphysics*, *Ethics*, and *Topics*.

The *Topics*, starting with a general explanation of syllogism and allied forms of reasoning, proceeds to investigate in what way the materials for dialectic argument are to be obtained and used. The elaborate treatment of what is now comparatively uninteresting has caused the significance of some portions of the work, as bearing on the theory of inductive research and demonstration generally, to be overlooked. Valuable hints are to be drawn from the work regarding other more important Aristotelian doctrines.[1]

12. The logical researches as a whole, then, manifest a strong unity, and at the same time refer to one fundamental opposition, that between *apodictic* and *dialectic* reasoning, the nature of which must be first investigated. It will be found that the investigation leads at once to the further problems, What precisely is Aristotle's conception of knowledge, in its origin, essential nature, and method of formation? and second, what is the foundation of the syllogism as the form of reasoning, whether apodictic or dialectic?[2]

[1] Generally one may say that a selection of these significant passages would be of greater service to the student than even so patient and detailed an abstract of the whole as is given by Grote (*Aristotle*, i. and ii.)

[2] The most important treatment of the principles and details of the Aristotelian logic, which are here drawn upon freely, are (1), *instar omnium*, that of Prantl (*Gesch. d. Logik*, i. pp. 87-346); (2) that of Brandis, *Aristoteles*, pp. 148-434, and *Aristotelisches Lehrge-*

The opposition between apodictic and dialectic is in the Aristotelian system the development of that which had already played so important a part in Plato and Socrates, the distinction between science and opinion. Knowledge in the strict sense had there presented itself as the generalised notion referring to being in its very essence, and resting on thought or reason. Opinion is the quasi-knowledge of the particular, referring to that which is not being but only accident, and resting on sense or imagination. In the Platonic method this distinction had come forward as the underlying basis for the opposition of philosophy and sophistical rhetoric; in Aristotle a much more precise formulation is given of the characteristics of the two opposed forms of thought, and the connection between opinion or dialectic and rhetorico-sophistical discussion is made more concrete and profound. Dialectic, with Aristotle, is the system resulting from the attempt to reduce to rule or generalise modes of argument which rest upon current received doctrines as principles, which move within the region of interests about which current opinions *pro* and *con* are to be found, and which terminate not in the decisive solution of a problem but in clearing the way for a more profound research, or at least in the establishment of the thesis as against an opponent.

bäude, pp. 12-62 (in which there is sharp criticism of Prantl's view); (3) that of Grote, *Aristotle*, vols. i. and ii. pp. 1-134 (most patient and accurate, but tending continuously to minimise the speculative element); (4) that of St Hilaire, in his essay *De la Logique d'Aristote*, 2 vols., 1838, and in his translation of the *Organon;* (5) that of Biese, *Phil. d. Arist.*, i. 44-319, Trendelenburg's *Elementa Logices Aristotelicæ*, Waitz's edition of the *Organon*, and Ueberweg's *System der Logik* contain much of value. Mr Poste's translation of the *Post. Anal.* and *Sophis. Elenchi*, Mr E. Wallace's *Outlines of the Phil. of Aristotle*, and Mr Magrath's *Selections from the Organon* will also be found of service.

Dialectic, then, has no special province; it deals with κοινά or ἔνδοξα, and its methods are perfectly general. On the one hand, as being the application of reasoning, it refers to and employs the specific types of reasoning, syllogism, and induction; on the other hand, as being applied to matters of opinion, and borrowing its principles from current floating dicta about matters of common interest, the types of reasoning tend in it to assume special forms resembling those employed in rhetoric (which is a kind of offshoot from dialectic—the application of dialectic to political principles).

The province of dialectic being thus essentially vague, the matters about which dialectic reasoning is concerned being of the most fluctuating character, there must be, for Aristotle, the greatest difficulty in determining, *per se* and apart from the opposition to apodictic, what is the character of dialectic syllogism and induction. Nor can it be said that the interpreter of Aristotle has an easy task in the endeavour to discover what precisely is dialectical reasoning and in what way the forms which are assumed to be common both to apodictic and dialectic come to have any application to the fluctuating mass of current opinions. It is comparatively simple to say apodictic and dialectic differ in this, that the one rests on principles essential, necessary, seen to be true, while the other proceeds from data which are merely received as credible and as containing probable received opinions on a subject about which there may be difference of view; and it may be added that in the one we reach conclusions which are essential, in which the predicate is necessarily and universally true of the subject, while in the other the conclusion remains, like the data, credible merely, and is, at best, only one of the probable answers to a

question. But there remains the difficulty, which is certainly not cleared up by any direct statement from Aristotle — of what nature is the syllogistic inference that applies to material of this kind? what is the *nervus probandi* in a dialectic syllogism?

There are two possible views—either that the principle of syllogistic inference is purely formal, deducible from the characteristic of thought as either affirming or denying in reference to a particular subject, and therefore capable of application either to probable or to necessary matter; or that the syllogism is explicable only as a form in which knowledge is established, and is applicable but *per accidens*, as one may express it, to probable matters. Under this second view, the possibility and reality of syllogistic inference would be traced to the correlative peculiarities of human thought and of the nature of the objects of thought, and it would follow that in strictness there is no dialectic syllogism. Such a conclusion at first sight appears to stand in sharp opposition to quite emphatic utterances of Aristotle; but if we suppose, for the sake of example, that a dialectic syllogism were framed, we should readily discern that the link of connection between data and conclusion, the *nervus probandi*, as it may be called, does not in fact differ from that involved in the apodictic syllogism. The merely probable character of the data prevents the conclusion from having a higher value than mere likelihood, but does not affect the chain of inference, which proceeds on assumptions identical with those involved in apodictic. Aristotle is chary of any examples of dialectic syllogism; and indeed, if one considers that all forms of modality are investigated in the general analysis of syllogism, it becomes difficult to see what specially distinguishes dialectic inference. It is not to be denied, however, that the

investigation of the grounds for the coexistence of dialectic and apodictic is incomplete in Aristotle, as it confessedly is in Plato.

Unless, then, it can be shown beyond possibility of question that Aristotle does lay down purely formal rules for syllogism, rules deducible simply from the fundamental axiom of thought—and the evidence on which such a view is based will be examined later—we do not obtain much light from the opposition between dialectic and apodictic. More important results, however, are gained when we consider the Aristotelian doctrine of genuine knowledge, of ἀπόδειξις, for, among the numerous elements that here fall to be noted, some are of quite general import, and apply to the whole process of the formation of knowledge.

13. Apodictic knowledge generally is definable through the special marks of its content. It deals with the universal and necessary, that which is now and always, that which cannot be other than it is, that which is what it is simply through its own nature. It is the expression of the true universal in thought and things, τὸ καθόλου. Further, as a method, ἀπόδειξις is characterised by the nature of its starting-point, and of the connecting link involved, as well as by the peculiarity of its result. It rests upon the first, simplest, best known, unprovable elements of thought, the πρῶτα καὶ ἄμεσα, which are not themselves in the strict sense matters of apodictic science, which are ἀναπόδεικτα. In all the intermediate processes of scientific proof there is involved generally this dependence upon previously established principles, and, when apodictic is taken in its ultimate abstraction, these previously established principles are seen to be the prior, ultimate elements, assumptions in thought about things, as one may provisionally describe

them. The peculiar connection involved is simply what we understand by the principle of syllogism. No syllogism is possible without the universalising element, the *καθόλου*, and knowledge in its essence is syllogistic.[1] The conclusion of the syllogism in which essential attributes are attached to a subject is the concretion or closing together of the two aspects of all thought and being, the universal and particular.[2]

The fuller explanation of apodictic thus refers us to three points of extreme importance in the Aristotelian theory of knowledge: the precise nature of the *καθόλου*, which presents itself as the characteristic feature of *ἀπόδειξις*; the relation of fundamental and universal in things on which the possibility of *ἀπόδειξις* is founded; and the forms of thought through which the universal and particular factors are subjectively realised. The three are most closely connected, and as they involve the main difficulties of the Aristotelian philosophy as a whole, a general treatment of them is indispensable. First then of *τὸ καθόλου*, the characteristic term in the explanation of knowledge. Of this term, as of others in the Aristotelian lexicon, the uses are various, more or less precise. In the less precise significance it is employed merely as equivalent to general or universal. Thus the universal

[1] *Cf. Topica*, pp. 164a 10.

[2] See specially *Anal. Pr.*, 67a 39 *sq.*, and compare the elaborate note of Kampe, *Erkenntnissthcorie des Arist.*, p. 220 (also p. 84). Grote (*Aristotle*, i. p. 263) remarks: "Complete cognition (*τὸ ἐνεργεῖν*, according to the view here set forth) consists of one mental act corresponding to the major premiss, another corresponding to the minor, and a third including both the two in conscious juxtaposition. The third implies both the first and the second." The connection between this and the Aristotelian doctrines of *νοῦς* in its relation to *αἴσθησις* will not escape attention.

judgment of the logical researches is λόγος καταφατικὸς ἢ ἀποφατικὸς καθόλου, *i.e.*, τὸ παντὶ ἢ μηδενὶ ὑπάρκειν. But there always underlies this vague significance a reference to the deeper doctrine according to which the *universal* is the more important element given in nature. For apodictic, then, which deals explicitly with this more profound sense, there is required a more stringent definition of καθόλου, and such is given with great precision by Aristotle. τὸ καθόλου is essentially double-sided. On the one side it is the universal of empirical knowledge, the generic or class universal —it is τὸ κατὰ παντός; on the other hand, it is the root or ground of the empirical universal—it is τό καθ' αὑτὸ καὶ ἢ αὐτό,[1] that which is in, for, and through itself, the essential. Now the essential, καθ' αὑτό, is in the first place, either that which enters into the being and notion of a thing as a necessary prerequisite (for example, *line* is a necessary element in the being and notion of triangle), or that which is the necessary basis of an attribute (*e.g.*, *line* in reference to *straight* and *curved*), or in the second place, that which is as subject only and not as predicate, or finally that which is *per se* the cause or ground of a fact or event.[2]

Thus the function of thought (of apodictic) is the exposition with reference to a determined class of objects of all that necessarily inheres in them, on account of the elementary factors which determine their existence and nature. Real things, individual objects, are the basis of

[1] *Anal. Post.*, 73b 26, καθόλου δὲ λέγω ὃ ἂν κατὰ παντός τε ὑπάρχῃ καὶ καθ' αὑτὸ καὶ ᾗ αὐτό. See *Index Aristotelicus*, *s.v.*, pp. 356-57, and on καθ' αὑτό compare Heyder, *Method. d. Arist.*, 310 *n.*, and Bonitz, *Com. in Met.*, pp. 265-66. On the distinction between καθόλου and γένος, see Bonitz, *Com. in Met.*, pp. 299, 300; Zeller, *Ph. d. Gr.*, ii. 1, p. 205, 206.

[2] *Cf.* Prantl, *Ges. d. Logik*, i. 121, 122, who has rightly placed the function of καθόλου in the foreground.

all knowledge, but in these individuals the elementary parts, causally connected, and leading to ulterior consequences, form the general element about which there may be demonstrative science. Thought which operates upon them does so, as we have already seen, under the peculiar restriction of its very nature, as the subjective realisation of the notion of things; and the principles expressing this restriction, the logical axioms, may be appealed to if demonstration be opposed groundlessly; but these axioms do not enter into the process of demonstration. "When the apodictic process has attained its end, that is, when all the universal propositions relating to a given class, with insight into the necessary character of the predication in each case, have been gathered up, then the καθόλου of knowledge in respect to that class has been realised."[1]

14. Probably the example of apodictic which Aristotle bears chiefly in mind is mathematical science, and in his treatment of the characteristic marks of this doctrine most of the peculiarities of apodictic occur. In mathematical science abstraction is made of the material qualities of the things considered, of those qualities which give to them a place as physical facts; but the abstracta are not to be conceived as entities, self-existing. They are not even to be conceived as existing only in mind, as ideal types; they truly exist in things, but are considered separately (ἐξ ἀφαιρέσεως). The first principles of mathematical science are few and definite, and the procedure is continuously from the simple and absolutely more known to the concrete and relatively more known. As in proof generally, so in mathematical demonstration, an essential quality (συμβεβηκός καθ' αὑτό) may be proved of a subject, and yet

[1] Prantl, i. 126.

such quality may be still accidental, *i.e.*, not predicated of the subject on account of its generic constituent marks, but capable of being deduced from the constituent mark of that which enters into the subject, as, *e.g.*, a given figure's exterior angles are equal to four right angles. Why? Because it is an isosceles triangle. Why has an isosceles this property? Because it is a triangle. Why has a triangle? Because it is a rectilineal figure. If this reason is ultimate, it completes our knowledge, *καὶ καθόλου δὲ τότε*.[1] Thus the range of mathematical proof extends from the *πρῶτα*, the original definitions, which at the same time assume the existence of the things defined, through the determinations *καθ' αὑτά* to the qualities (*συμβεβήκοτα*), which can be shown to attach to their subjects, to be in a sense *καθ' αὑτά*, while a continuous series of middle notions, concerning which there cannot be much ambiguity, effects the transition.

Moreover, in mathematical science, one can see with the utmost evidence the correlation of reason and sense, which will presently appear as a fundamental factor in Aristotle's general theory of knowledge. The *πρῶτα* are not to be conceived as innate or as possessed before experience. They are seen or envisaged, intuited in perception by *νοῦς*, and induction here as elsewhere is the process by which perceptions are gathered together for the reflective and intuiting action of *νοῦς*. In the mathematical individual, more evidently than in any other case, is visible the union of thought and sense. The demonstration which employs a diagram does not turn upon any properties of the diagram which are there for sense only, not for reason, but upon the general elementary relations contemplated in

[1] *Anal. Post.*, i. 24, 86a 2.

thought.[1] In mathematical development, that which is potentially contained in the ὕλη νοητή on which mathematical thinking operates is brought forward into actuality by the constructive processes through which the proof is mediated, and the potential knowledge contained in the intuition of mathematical elements becomes actual through the process of constructive thought.[2]

Finally, the relation of pure mathematical reasoning to that found in sciences generically one with mathematics, *e.g.*, optics, astronomy, harmonics, &c., furnishes an interesting example of the relation between reasoning based on fact and on causal ground.[3]

15. The process of ἀπόδειξις generally and of mathematical demonstration in particular has brought into clear light the prominent characteristic of knowledge according to the Aristotelian view. Knowledge must always be regarded from two sides, as having relation to the universal,

[1] *Cf.* the passage from *De Memor.*, p. 450, quoted by Brandis, *Aristoteles*, p. 1133—*συμβαίνει γὰρ τὸ αὐτὸ πάθος ἐν τῷ νοεῖν ὅπερ καὶ ἐν τῷ διαγράφειν· ἐκεῖ τε γὰρ οὐθὲν προσχρώμενοι τῷ τὸ ποσὸν ὡρισμένον εἶναι τὸ τριγώνου, ὅμως γράφομεν ὡρισμένον κατὰ τὸ ποσόν· καὶ ὁ νοῶν ὡσαύτως, κἂν μὴ ποσὸν νοῇ, τίθεται πρὸ ὀμμάτων ποσόν, νοεῖ δ' οὐχ ᾗ ποσόν. ἂν δ' ἡ φύσις ᾗ τῶν ποσῶν, ἀόριστον δέ, τίθεται μὲν ποσὸν ὡρισμένον, νοεῖ δ' ᾗ ποσόν μόνον. Cf.* also *Met.*, vii. 10 and 11. Aristotle's view strongly resembles, in this point at least, that of Kant.

[2] See *Metaph.*, ix. c. 9, p. 1051a. Some interesting remarks on the process of mathematical construction and its relation to syllogistic proof will be found in Ueberweg's *System der Logik*, § 101, p. 273.

[3] See generally *Anal. Post.*, chap. 13. Of Aristotle's views on mathematics the best expositions seem to be those of Biese (*Ph. d. Arist.*, ii. 216-34), Brandis (*Aristoteles*, pp. 135-39, and *Aristot. Lehrgebäude*, 7-11), and Eucken (*Methode d. Arist. Forschung*, pp. 56, 66).

and as bearing upon the particular.[1] It is in itself the union of the general and the particular, of the universal and the individual. This fundamental notion of knowledge is not only the integral element in the Aristotelian theory of science, but also the guiding principle in his scientific method.[2] In all cases we require to keep in mind the necessary correlation of the particular facts and the general grounds, the multiplicity of effects and the unity of cause. The one element is not apart from the other. Universals as such are of no avail either as explanations of knowledge or as grounds of existence. Particulars as such are infinite, indefinite, and incognisable. Only in the union of these—a union which objectively regarded is the combination of form and matter, of potentiality and actuality, of genus and ultimate difference, subjectively is the combination of the data of sense, imagination, and intuitive faculty of reason—is knowledge possible. And the methods by which knowledge is formed in us regarding things exhibit the same twofold aspect. Syllogism as the form of the process from generalia to the determination of attributes of the individual subject, induction as the method of procedure from the vaguely apprehended individuals to the generalia or principles, alike, when analysed, exhibit the conjunction of the universal and particular.

But while this general view is undoubtedly to be ascribed to Aristotle, it is no less undoubted that grave difficulties are felt when his various utterances on the fundamental points of the doctrine are placed side by side and the attempt made to extract from them a harmonious and con-

[1] *Cf.* specially *Anal. Pr.*, ii. 21.

[2] This is excellently put by Eucken, *op. cit.*, pp. 44-55.

sistent doctrine.[1] That some of these difficulties are due to the fragmentary condition in which the successive treatments of the question have come down to us may be allowed; but, as the question involved is in truth the cardinal difficulty of all metaphysical thought, it may well be said that a quite harmonious view is not to be expected; and in particular this may be said when one considers the doctrine of perception in which the metaphysical determinations of universal and particular come forward in subjective fashion.

16. Opposing throughout the Platonic doctrines of Ideas, separable from the objects known, and declaring that the assumption of such isolated forms not only involved contradictions but was of no service in solving the problems of generation and of knowledge, Aristotle is led to emphasise the individual as the ultimate fact in existence and cognition. Universals as classes have no separate substantive existence: they do not indicate the individual τόδε τι, but a property or quality common to many individuals, ποῖον τι; their function is predicative. No doubt they are οὐσίαι in a sense, for they indirectly refer to individuals—*i.e.*, one cannot overlook the closeness of connection between the individual things having essential attributes in common and the notion of these attributes.[2] The individual thing

[1] See specially the treatment by Heyder, *Methodol. d. Arist.*, pp. 140-216, which is most instructive and comprehensive. The commentaries of Bonitz and Schwegler on the relative portions of the *Metaph.* (iii. cc. 4 and 6, vii. and xiii. 10) should be consulted. Zeller (*Phil. d. Gr.*, ii. 2, pp. 300-313) brings out the fundamental difficulty, and notes some attempted solutions of it. Kampe (*Erkenntnisstheorie d. Arist.*, 160-170) lays special stress on the subjective or psychological aspect.

[2] It is probably the most helpful view, and one enabling us alto-

is the basis of all attributes, it is the underlying reality which presents itself in the natural process of becoming as the subject determined in existence, quality, quantity, relation, &c.[1] But what is the individual thing? It can hardly be said that to this Aristotle returns any single unambiguous reply; his utterances, in fact, disclose a real difficulty, and point to the presence of a twofold conception of the individual: the individual as the ultimate, unqualified, undetermined unit, the last result of abstraction; and the individual as the concrete thing, qualified and determined to the full extent by its generic and specific marks. With these diverse conceptions floating before him, now one, now the other becoming prominent according to the special problem in hand, Aristotle's expressions sometimes present apparently irreconcilable divergencies. The difficulty specially pressing upon him was one arising from the definition of knowledge. Knowledge is of the general and necessary; how then can there be knowledge of the individual? Knowledge is not a process capable of infinite regress; its principles are definite and its method determinate. But particulars are infinite; how then can there be knowledge of them?[2] Aspects of the same difficulty present themselves at every stage in which reference is made to the nature of ultimate parts or elements, as, *e.g.*, the parts of definition and of the definiendum. So far as solution is offered it is the following:—

The *subject* or *substratum* of predicates is certainly one mode of describing the ultimate fact in existence and

gether to reject the fancied opposition between the *Categoriæ* and the *Metaph.*, to regard δεύτεραι οὐσίαι as specially the concrete general notions, in respect of which there is always confusion possible between the thought-content and the real class referred to.

[1] See below, p. 176 *sq.*

[2] *Met.*, 999a 26, 1003a 5, and *cf.* xiii. c. 10.

knowledge. But this subject, as a concretum or *σύνολον*, contains in itself matter and form. Form when first analysed appears to consist of those very predicates which we have already seen to be secondary in nature, and when abstraction is made of them, there appears to remain nothing save undetermined matter. Now matter is precisely that which in itself is incognisable. The truth is our first analysis is imperfect. The connection of *ὕλη* and *εἶδος* in the *σύνολον* is not mechanical aggregation, nor is *εἶδος* to be identified with generic properties regarded as generic. The form is the intelligible universal element in the concretum; it is that which gives definiteness, actuality to the indefiniteness and potentiality of matter. It is the formal cause, the notional essence of the thing, and its perfect expression in thought is the definition, for in the definition the generic properties of the thing and its ultimate specific difference (*διαφορά τελευταία*) are the necessary elements. It is *notional essence*, *i.e.*, it is the unity of the essential properties as grasped by thought and apprehended as really existing.

The individual would thus appear in the Aristotelian metaphysic as the union of the universal and definite with the particular and indefinite, and in a sense as the final goal of the determining process of knowledge; for the *τι ἦν εἶναι*, which is the notion of *τόδε τι*, is expressed in definition, the last result of scientific knowledge.[1] Such

[1] Such a result, it appears to be said in the chapter of the *Metaphysics* previously referred to (xiii. c. 10), when supplemented by a special distinction, may yield a solution of the difficulty regarding knowledge as essentially general and things known as essentially individual. "Knowledge, like the act of cognising, is either in potentiality or in actuality. In potentiality, *i.e.*, in the aspect in which it resembles matter, itself universal and indeterminate, knowledge is universal and indeterminate; in actuality, as being definite and individualising, it is definite and of the individual." The passage

a conception, however, is not carried out consistently, and, in particular, fails to reconcile itself with the doctrine of the individual that comes forward, partly in the metaphysics, but mainly in what one might call the Aristotelian theory of knowledge.

17. It is not possible to hold questions of metaphysic strictly apart from those of theory of knowledge, and in Aristotle's treatment of the universal and particular we find that the main features of interest attach to the conditions under which an individual or general is cognisable. Now, throughout the analytical researches, the rhetoric, ethics, and generally the subordinate branches of philosophy, one notes an apparently well-defined significance attached to the individual. Τά καθ' ἕκαστα, the particulars of experience, present themselves as the first given data of knowledge, the basis upon which progress to principles or generalia is founded. Τὰ καθ' ἕκαστα are prior or simpler so far as our cognition is concerned; and arguments based on apprehension of them, arguments of fact or effect, are more persuasive and more easily grasped than arguments from principles or causes. Apparently, also, if we confined attention to some of the more direct *dicta* on this perplexing doctrine, we might assume that, according to Aristotle, knowledge was to be conceived as first ascend-

has never appeared very satisfactory to commentators. Doubtless we might interpret it freely in connection with the distinctions given below respecting knowledge and perception; but it is specially interesting to notice how this description of cognition as twofold, as of the indefinite, and so universal in one aspect and not in another, as of the individual, and so not universal in one aspect while most truly universal in another, applies to mathematical cognition as above sketched by Aristotle. — *Cf.* Brandis, *Aristotelisches Lehrgebäude* (*Ges. d. gr.-röm. Phil.*, iii.: 1), p. 9.

ing inductively from particulars to the universal, and then descending deductively from these. This, however, is an altogether inadequate view; and hints are supplied which, though not enabling a quite coherent doctrine to be formed, yet enable us to understand somewhat more clearly not only the special difficulty experienced by Aristotle, but also his method of solving it. Of those hints but two groups can be here taken into consideration.

(1) The particulars, *τὰ καθ' ἕκαστα*, are objects of perception, *αἰσθητά*. It has already been seen that *τόδε τι* involves form and matter, and is the concretum of both. Perception then might be supposed to be a complex process, involving in some way apprehension of form and receptivity of matter, and containing subjectively both. Aristotle's analysis of perception is far from complete, but we are able to say with respect to it that in his view *αἴσθησις* is not to be regarded as a simple process, directly receptive of the individual as such. Such a view of perception is altogether foreign to the Aristotelian psychology in which the subjective processes of mind, with the objective system of things, are conceived as mutually involving and involved, in which the lower faculties, as we may call them, potentially contain the higher, in which the subjective process of knowledge is the evolution of that which is contained in an undetermined, indefinite form in the lower stages of apprehension. Thus Aristotle not only marks that sense-perception as a whole is apprehensive of the *καθόλου*, while separate acts of perception are apprehensions of the individual, but he distinguishes in perception aspects or stages which, in more modern phraseology, might be described as (*a*) receptivity of impression, (*b*) intuition of sense forms, (*c*) classification with representations of past experience. In each sense-perception there is apprehension of the proper sensible,

and also apprehension of the common forms of sense intuition, and finally, there is apprehension of the *αἰσθητὸν κατὰ συμβεβηκός*, which is virtually recognition of the individual as representative of something else. Perception, then, one may say, is used both in a vague sense as marking, with respect to the genesis of knowledge, the apprehension of facts, and in a more exact sense, as a compound involving not only receptivity but also the cognising power *par excellence*, *i.e.*, *νοῦς*. Only by the presence of *νοῦς* is light given to the processes of perception.

(2) Quite in accordance with this is the Aristotelian view of the apprehension of principles or generalia. *Καθόλου* is nothing *per se;* it is only as related to particulars. In no way, then, save in and by apprehension of particulars, can the universal be reached. Were it not for the natural power of retention, the collecting of similars in experience, and the formation of a permanent representation, the intuiting power of *νοῦς* would have no object. But the two sides are not to be conceived as isolated. They are only in correlation, and one can thus understand how Aristotle should both assert that principles are reached by induction, and that *νοῦς* alone is the source of principles. The ultimate principles are seized or apprehended by *νοῦς*, and in respect of them the form of knowledge does not take the form of a judgment, which may be true or false. The principles are either apprehended or not apprehended. All intermediate truths, capable of proof by reference to even higher principles, form the matter of apodictic, that is to say, of *νοῦς* in its twofold aspect as at once apprehensive of universals and of particulars. Deductive proof and induction are two strictly correlated processes.

Although this general view undoubtedly represents a true Aristotelian position, yet there remain a sufficient

number of expressions of opposed tenor which point to the existence of a real difficulty and of an ambiguity in Aristotle's conception of the individual as known to us. For in the theory of the formation of knowledge, induction is continuously defined as starting from the individual definite thing known, the part, and it is explicitly stated that knowledge of the individual does not imply knowledge of the general, that the one is an affair of sense-perception, the other of intellect.[1] Αἴσθησις is with equal explicitness said to be of the universal and not of the universal.[2] It is pointedly declared that induction rests on *αἴσθησις*, while at times the two processes seem to be opposed. Finally, the process by which a universal is gathered from induction leaves it doubtful to what extent the generalising force of *νοῦς* is to be assumed as present at all stages of the process. For we are said not to have the universal immediately in the particulars given, but to hunt it out (*τὸ καθόλου θηρεύειν*); and in those cases in which the connection, necessarily expressible in a general law, between two facts is actually perceived, it is declared that we do not see (perceive) the universal, but have the universal from the perception (*ἔχοντες τὸ καθόλου ἐκ τοῦ ὁρᾶν*).

These discrepancies of statement arise in part from the extreme difficulty of adequately expressing the constant correlation of universal and particular, that is, of expressing in all cases so that the conjunction shall be kept in mind, and in part form a real philosophical ambiguity in Aris-

[1] *ὁ δὲ ταύτην ἔχων τὴν πρότασιν* (viz., that an isosceles triangle has its angles equal to two right angles) *τὸ καθόλου* (viz., that all triangles have this attribute) *οὐδαμῶς οἶδεν, οὔτε δυνάμει οὔτ' ἐνεργείᾳ· καὶ ἡ μὲν καθόλου νοητή, ἡ δὲ κατὰ μέρος εἰς αἴσθησιν τελευτᾷ.—Anal. Post.*, 86a 28-30.

[2] *οὐ γὰρ ἦν τοῦ καθόλου αἴσθησις.—Anal. Post.*, 88a 2. *ἡ δ' αἴσθησις τοῦ καθόλου ἐστίν.—Anal. Post.*, 100b 17.

totle's doctrine, an ambiguity which is not found only in his system. *The* universal which is implicated in the particulars is not one only, but several. For example, in the case used by Aristotle of the isosceles triangle, the universal, triangle, is not in this respect implicated that the proof is seen to involve reference to the wider class; but, none the less, since the actual knowledge is not of the given sense fact, an isosceles triangle drawn before one, but of that which is signified by the figure, there is *a* universal present—viz., isosceles triangle. So if we take, for example, effects presented in experience and apprehended, as Aristotle would say, by αἴσθησις, it is not indispensable for our apprehension of them that the notion of the specific cause giving rise to them should be implicated in turn. The universal, in this concrete sense, is present neither potentially nor actually. Nevertheless, each fact, as a phenomenon of apprehension, is only as a combination of general elements with particular. The progress of knowledge might with equal accuracy be described as a progress from the vague, indefinite universal to the precise determinate particular, or from the determinate particular to the more extensive universal. Accurate statement of this twofold nature of the elements of knowledge, and consequent formulation of the theory of knowledge so as to embrace both, we do not find in Aristotle, but we do find abundant hints from which the true view may be elicited.

18. If there is, then, ambiguity in regard to Aristotle's conception of the individual, one would expect to find similar difficulties in respect to the universal. Yet here, in virtue of the strong opposition to the Platonic theory of generic or class universals, a much more accurate and precise

determination of the fundamental notion is furnished by Aristotle. To him the universal as such is not the class, or common attributes as they may be gathered by observation, induction, and division, but the notion of the ground or reason, of these elements whereby each thing has its position defined in what may be called the intelligible system of things. That Aristotle succeeds in making quite clear this new and fruitful idea, that he distinguishes with sufficient care and precision between the subjective elements of the conception (the forms in which the notion is realised in our thought) and the objective or real causes by which the system of things is held together, we cannot affirm; but the formal subjective side of his doctrine is expounded with extraordinary sagacity, and lies at the very root of his theory of apodictic.

19. The characteristics of scientific knowledge have thus become evident. In each branch of knowledge there are involved, as before said, the specific genus or class, the attributes concerning which there is to be demonstration, and the common axioms or principles. Each branch, moreover, implies special principles, *ἴδιαι ἀρχαί;* there is no all-comprehensive science from which truths are to be deduced, and from the common maxims alone nothing can be inferred. *Ἀπόδειξις* involves principles, and starts therefore of necessity with what may be called definitions. Yet definitions are at the same time the final result of apodictic demonstration, and the original assumptions may be pushed farther and farther back till they appear as the *πρῶται καὶ ἄμεσοι προτάσεις* which are only apprehended by *νοῦς*. From this distinction between knowledge as completed and knowledge as in process of formation, as from the distinction between sciences of the same genus as more

or less general (*e.g.*, geometry and optics), there follow the distinctions between propositions necessary and propositions true ἐπὶ τὸ πολύ, between proof of fact and proof of essence, between deduction and induction, between syllogism as generic form of all proof, and the special type of syllogism in which completed knowledge is expressed.

We are thus enabled to reconcile what seem at first sight discrepancies in the Aristotelian doctrine,—as, *e.g.*, the insistence upon induction as furnishing the principles of reasoning (τὰ καθόλου) coupled with the attempt to show that induction too is a kind of syllogism; the explanation of proof as involving essence, coupled with the admission of syllogisms of fact; the treatment of propositions as necessary and contingent in themselves, coupled with the distinction between ἐπιστήμη and δόξα. In all forms of knowledge there is the twofold aspect, that which turns upon the essential connections, and that which refers to the isolated facts wherein such connections make their appearance. Syllogistic as formal analysis of what is common in all knowledge is one part of the all-comprehensive theory of knowledge, an integral but not a self-existing part.[1]

[1] The passages in which an apparently formal view of logical relations is expressed are mainly the following: *Topica*, i. chap. vi. (in which the fundamental logical forms of definition, genus, property, and accident are explained by reference to the coincidence of the spheres of subject and predicate in a proposition); *Anal. Post.*, i. chap. 26 (συλλογισμός ἐστιν, ὃς ἂν οὕτως ἔχῃ, ὥστε ἢ ὅλον πρὸς μέρος ἢ μέρος πρὸς ὅλον ἔχειν); *Anal. Post.*, ii. 3 (ἑτέρου δὲ ἑτέρα ἀπόδειξις, ἐὰν μὴ ὡς μέρος ᾖ τι τῆς ὅλης. τοῦτο δὲ λέγω, ὅτι δέδεικται τὸ ἰσοσκελὲς δύο ὀρθαῖς, εἰ πᾶν τρίγωνον δέδεικται· μέρος γάρ· τὸ δ' ὅλον); *Rhetorica*, i. 2, § 19. The general treatment of syllogism in *Anal. Pr.*, i. 4, as apparently resting on the principle of subsumption or logical substitution, has no precise bearing. But the use of the term ὅλον by Aristotle is not to be regarded as identical with its use by

20. The general idea of the Aristotelian analytic thus obtained does not require to be supplemented by any detailed survey of the logical system into which it is evolved; but a brief summary of the most important points and indication of the relation in which the parts stand to the whole may be of advantage.

The simplest form of knowledge, that in which being as true or false is apprehended, is the judgment. The consideration of the judgment is therefore the first part of the analytical researches. Here Aristotle distinguishes more accurately than any of his predecessors (indeed for the first time with accuracy) between subject and predicate as integral parts, symbolised by the noun and verb, and signifying the relations for us of things as appearing under the schemata of the categories. The material basis of the judgment, as one may call it, is the thing as an object of possible knowledge, *i.e.*, the thing as individual (and therefore as involving matter and form, the particular and the general), as qualified, specifically, in time, space, quantity, and relation, and existing as one mode in the universal nexus of potentiality and actuality. These metaphysical forms, and, specially, the deep-lying modes of potentiality

later logicians, and it is not rashly to be assumed that in Aristotle's view the only logical relation is that between genus and species. The distinction between extent and intent, on which later writers have laid stress, is never suffered in Aristotle to become a distinction in kind; the two elements, extent and content (*κατὰ παντὸς* and *καθ' αὑτό*), are always involved, and the difference is only in the process by which our knowledge is formed. Probably the relations of extent and content would never have been severed from one another had it not been for the error, almost a necessary failing in the attempt to treat formal logic systematically, of regarding notions and judgments as completely formed and defined products apart from the reasoning in which they appear (see, for a diametrically opposed view, Hamilton, *Lectures on Logic*, ii. p. 266).

and actuality, reflect themselves in the forms whereby subjectively knowledge is realised in us; and the resulting knowledge is conditioned partly by them, partly by the modes in which intellect as a reality is developed in us. The proposition has necessarily a reference to them; and thus, alongside of formal distinctions between universal, particular, singular, and indefinite judgments, we have the distinctions between necessary, contingent, and possible, which appear partly as given qualities of the judgment, partly as representing differences in the conditions of knowledge, partly as referring to differences of subjective apprehension.

The essence of the judgment as the apprehension of truth or falsehood consists in its twofold aspect as affirmative and negative, the former of these in a sense prior and better known, but the latter no less necessary, and both referring to objective relations of things. The affirmative and negative character of judgments, the essential ἀντίφασις of human thought, is further defined in reference to (*a*) the quantitative distinctions already recognised (the doctrine of logical opposition), (*b*) the distinctions of necessary, contingent, and possible, which are rightly regarded as real matters *about which* the assertion is,[1] and (*c*), consequent on this, the opposition of modal judgments.[2]

[1] On this account the *modality* is affirmed not to attach to the copula; thus the opposite of "it is necessary-to-be" is "it is not necessary-to-be," and not either "it is necessary-not-to-be," or "it is not-necessary-to-be."

[2] There are obscurities in Aristotle's doctrine of modals which remain even after Prantl's laborious treatment (*Ges. d. Logik*, i. 104-82). A careful survey is given in Rondelet, *Théorie logique des propositions modales*, 1861. The definitions of ἐνδεχόμενον and δυνατόν, which have given rise to much diversity of opinion (*cf.* Prantl, i. 167 *sq.*, as against Waitz, i. 376, and Bonitz, p. 387), are excellently dealt with by Ueberweg, *Logik*, § 69.

Propositions as integral parts of knowledge turn upon the ultimate relations of things known. The distinctions between first principles and deduced truths, out of which the theory of proof is developed, themselves rest upon those distinctions which have been already noted in treating of apodictic. Syllogism as the form by which the general and particular elements are mediated and conjoined is therefore of universal application, and may be analysed formally.[1] The various modes in which syllogistic inference, pure or modal, the main types to which these modes may be reduced, their relations to one another, and the general laws implied in them, are worked out in a fashion which does not admit of any brief statement. The conclusion unites the elements which in isolation appear in the premisses, and is, in a sense, the complex or organic whole unfolded in the syllogistic form. To every syllogism three things are necessary, the presence of a positive element, universality in one of the premisses (resting, as above shown, on the recognised property of all proof as involving a general fact), and *consequence*, or necessary connection between conclusion and premisses. Now from this third element there follow certain interesting deductions. The necessity of consequence rests on the very nature of syllogistic thought, and if each syllogism be taken as it stands, as a simple unit, no further inquiry is needful. But the character of the premisses in themselves may be taken into account, and we then discover that syllogism proceeds continuously on the assumption that the general law of syllogistic proof is in the special case realised. It need

[1] In this sense only can we recognise the distinction between Aristotle's *Technik* and his idea of *Apodiktik* on which Lange (*Logische Studien*, 1880) has laid so much stress. What underlies Aristotle's treatment must never be thrown out of account.

not be in fact realised. We may have premisses in themselves false, from which a true conclusion is reached, and the falsity of the premisses only becomes apparent when they are themselves treated as conclusions of a possible syllogism, and so the regress made towards ultimate principles.

Syllogistic form, in short, is the hypothetical application of the general rule of necessary connection between ground and consequent. If A (the premisses), then B (the conclusion). Quite possibly, then, we may have, in syllogistic form, conclusions drawn from premisses not *ἀναγκαῖα* but only *ὡς ἐπὶ τὸ πολύ*. Science and opinion (*δόξα*) are equally sources of propositions or premisses. If formal consequence be united with real uncertainty of matter, there arises a syllogism in character dialectical. Were the real uncertainty overlooked, the syllogism would be sophistic in character. Dialectical reasoning, then, dealing with the stage beneath science, may be of service, not only for practice in distinguishing true and false, but as bringing the particulars of each branch of knowledge into closer relation with the first principles special to that branch.[1] For wherever the particular element as such, the transitory and material, is present, there room is left for opinion, and reasoning is possible, not of the particular as such, but in so far as the particular manifests an underlying universal.[2] The processes of dialectic reasoning thus resemble very closely those modes by which the empirical detail, the region of given fact, is treated—viz., induction, example, use of signs and probable indications. For the universal has always its empirical side, and the complete process of

[1] *Topica*, i. 2, §§ 3-6.

[2] On this distinction *cf.* Kampe, *Erkenntnisstheorie d. A.*, pp. 252, 253; Heyder, *Method. d. A.*, p. 322.

scientific proof is a final result for which the way may be prepared by treatment, according to scientific form, of the empirical fact. There are syllogisms of fact as well as syllogisms of reason or ground, and the reason or ground becomes apparent through knowledge of the fact. Occasionally indeed the fact and ground are so immediately connected that transition from one to the other may be at once effected, but generally this is not the case.

Of these intermediate forms of reasoning, the only one calling for comment is induction, of the nature of which something has already been said. The obscure chapter in which the formal analysis of induction is undertaken, a chapter which has much exercised the ingenuity of commentators,[1] presents difficulties of various kinds. An opposition is indicated between syllogism and induction, yet induction is treated as a kind of syllogism; that is, freely interpreted, induction is so analysed as to show that in it, also, there is the union of general assumption and particular detail which is characteristic of syllogistic reasoning. Further, Aristotle seems to waver between induction as a kind of inference, through which we arrive at general principles, and as a species of proof, and his teaching is therefore perplexed by the want of some clear statement regarding a difficulty in the theory of induction, which is still far from perfect solution. For, according to Aristotle, induction as such, starting from the particulars of sense, and proceeding by comparison of similar cases and enumeration of all the similarly constituted members, never, even when the enumeration is complete, attains to probative force.[2] It

[1] *Anal. Pr.*, ii. 23. *Cf.* Whewell, *Camb. Phil. Soc. Trans.*, vol. ix., 1856: Hamilton, *Lectures*, ii. 358-62; Grote, i. pp. 268-74; Heyder, 216-26; Kampe, 189-92.

[2] On induction and recognition of similarity, see *Topica*, i.

is still a syllogism of fact, not of ground or reason ; there is a distinction of kind between the survey of empirical detail, even when complete, and the assertion of causal connection between the characteristics of the class and its deduced properties.[1] Thus, perception of the law (τὸ καθόλου) from induction is a kind of new element in the process ; it is recognition *by means of* the empirico-critical survey which is the essence of induction.[2] Induction makes clear only, and does not prove.[3] If we interpret according to more modern phraseology, this peculiarity may be expressed as the distinctive feature of inductive research based on facts or effects. We do not regard the inquiry as terminating in the establishment of a law until it is possible to reverse the process and show that from the surmised cause the effects do actually follow. Otherwise we have a conclusion of "coexistence" merely—an empirical rule or generalisation.

If, bearing in mind these sources of difficulty, and also the correlation which for Aristotle always obtains between empirical details and grounds of reason, we consider the example given in the obscure chapter before us, some light may be cast on the exposition there given. The example selected is one touched upon by Aristotle in other two

chap. 18, p. 108b 7 *sq.*; viii. chap. 1, § 14, and chap. 8, § 1 (in these last similarity is viewed as being wider in scope than the basis of induction). That induction implies a complete enumeration, see *Anal. Pr.*, ii. chaps. 23, 24 ; *Anal. Post.*, ii. chap. 7, § 1. That induction even when complete is not demonstrative, see *Anal. Post.*, i. chap. 5.

[1] On this distinction see mainly *Anal. Post.*, ii. 13, where a very fine description of deductive and inductive proof occurs.

[2] Compare the passages above noted, and see the curious expression used in the discussion regarding the relation of universal and particular in *Anal. Pr.*, ii. 21, p. 67a 22 *sq.*

[3] *Anal. Post.*, ii. 5, p. 91b 34, οὐδέ γὰρ ὁ ἐπάγων ἴσως ἀποδείκνυσιν, ἀλλ' ὅμως δηλοῖ τι.

pasasges, in the treatise *De Partibus Animalium*, and in the *Post. Anal.*, ii. 18.[1] As regards the first of these, reference is desirable only to bring out the fact that causal nexus is the καθόλου in question; the second is of the utmost importance as clearing up what has always seemed an obscurity in the account of the inductive syllogism. In the chapters 16-18 of *Anal. Post.*, ii., Aristotle considers the relation of cause and effect as the essential basis of proof, and he points out with much clearness the difference between the fact as cause of knowledge and the cause as ground of existence and proof. In some cases cause and effect are so united, so reciprocate, that we may infer from one to the other. But the doubt arises, may there not be more than one cause for any given attribute? in which case all such inferences from effect must become problematical. Aristotle's solution is remarkable, both in itself and in its bearing on the inductive syllogism. Suppose the attribute β is found in all individuals of a class A, and also in individuals of class B, C, &c. In order to discover the cause, investigations must be carried on until we have a defined number of classes A, B, C, &c., in all of which β is found, and which comprehend all cases of the presence of β. Then that which is also common to A, B, C, &c., may be regarded as the cause of β, say, *e.g.*, an attribute α. If this attribute α be really the cause of β, it will enter into its definition; it will be its definition. There might, however, be a connection of α and β of this universal and reciprocating kind, and yet α might not be the cause in question; it might be only a fact from which β could be inferred; the real cause γ, which gives rise to α, lies in the

[1] *De Part. Anim.*, iv. 2. *Cf.* Hamilton, *Lect.*, iv. p. 358, *n.* On *Anal. Post.*, ii. 16-18, see the valuable summary by Grote, i. pp. 366-68.

background. Characteristic of causation, then, is constant reciprocal conjunction of facts. Even if it be admitted, then, that there may be more causes for a phenomenon than one, it will yet be true that each of these causes will be manifested in one class of phenomena where there will be the universal reciprocating coexistence that is characteristic of the relation in question. Thus the attribute longevity observable in quadruped animals and in birds may be due to different causes, *e.g.*, to absence of gall in the one case, to predominance of solid, dry matter in the other. But in each case there will be a definite species characterised by the constant conjunction of the cause and the causatum ; the whole class long-lived animals and the class gall-less animals will coincide.

Turning now to the chapter on inductive syllogism, we find induction defined as inference through the minor that the major belongs to the middle. Here evidently major and middle are regarded not as determined by form only but as naturally distinct, and we must assume that by middle term is to be understood the ground or reason of the attribute (major term) characteristic of a defined species or group (the middle term). Were our knowledge complete and scientific, we should be able to express this in apodictic form: whatever animal has no gall is long-lived ; man, horse, mule, &c., are animals having no gall ; therefore they are long-lived. The progress of knowledge, however, may be from the empirical details. We may have given to us the fact of the attribute, long-livedness, in the group of animals, man, horse, &c., and discover that these long-lived animals are also wanting in gall. If, then, in accordance with the rules above sketched, there can be discovered a reciprocating relation between want of gall in animals and long-livedness, if we can constitute a class distinguished by

conjoint presence of gall-lessness and longevity, we have the basis for an inductive proof. We may infer therefrom that gall-lessness is, *in this species*, the cause of longevity. Such a reasoning is founded on particulars given, and as the coexistence is given, the conclusion seems to be immediately drawn; there does not appear to be mediation or use of a middle term; nevertheless the middle term is implied, not in the supposition that the two classes reciprocrate, but in the transference from empirical coexistence to causal nexus.

Aristotle's mode of stating this argument has presented so many difficulties of interpretation that various emendations have been proposed. Grote, *e.g.*, who has not apprehended why the class long-lived animals should be taken universally,—"we are," he says, "in no way concerned with the totality of long-lived animals,"—suggests an emendation, which makes the essence of the inductive reasoning turn upon the extension of what we know regarding some gall-less animals to all of that class. But this is not the inductive step according to Aristotle. Induction has not to prove or assume that α and β, found coexisting in some members of the species, coexist in all of them; Aristotle takes this universal coexistence for granted as the basis of the argument. The inductive step is the transference from this universal coexistence to causal nexus. Apodictically, we should say, if α is the cause of β, then all A which possesses α possesses β; thus reasoning from cause to causatum. Inductively we say, all A which possesses α has β; therefore α is the cause of β.[1]

[1] The following is the relative portion of chap. 23 of bk. ii. of the *Anal. Pr.*: "Now induction and syllogism through induction is the process of concluding by means of the minor term that the major term is predicable of the middle" (that is to say, of concluding from

Induction, as dealing with particulars, starting with the sense data, and resting upon the more evident fact in order to point towards the essential ground or reason, is therefore more persuasive, more palpable, more adapted for popular

given facts that an attribute found in all of them is the effect of some other attribute also found in all of them). "For example, if B be the middle term, A and C the extremes, we show, by means of C, that A is predicable of B; for this is the inductive process. Thus, let A be long-lived; B, those wanting gall; C, individual long-lived, as man, horse, mule. Then A is predicated universally of C" (that is to say, the attribute A is found in all the examples before us), "for also that which wants gall is long-lived" (that is to say, as a given fact, gall-lessness and longevity in the species, group, before us coexist). "B, wanting gall, thus is predicated universally of C. If then B and C be reciprocating, if C do not extend beyond the middle term" (that is, if we do not find other animals than the long-lived animals enumerated which also are devoid of gall), "it is necessary that A should be predicated of B. For it has been shown previously that if two terms are predicable of the same third, and if the extreme reciprocate with one of these, then the other of those predicates will be predicable of that with which the first reciprocated; but it is necessary to know that C is the complex of all the individual cases." The last sentence is extremely hard to interpret. The expression τὸ ἄκρον occurring in it is generally the technical word for major term, but as in the syllogism before us the major term is one of the predicates, this signification would seem to contradict the words πρὸς θάτερον αὐτῶν. Hamilton reads τὸ μέσον, which makes the argument intelligible and coherent with the passage apparently referred to in δέδεικται πρότερον—viz., *Anal. Pr.*, ii. 21, p. 68a 21-25. Probably Aristotle uses τὸ ἄκρον here as equivalent to C, the ἄκρον through which the induction proceeds. According to the view taken above, the essence of the Aristotelian induction does not at all lie in the universalising of C, but in connecting in one proposition the attributes B and A found to coexist in the group C. There is thus in one sense no middle, for cause is not reached; in another sense there is, for C is the material link connecting A and B. Aristotle then might naturally use ἄκρον for C, and assimilate the process of induction to a syllogism in which there was reciprocation of terms. In fact, however, induction regarded after his fashion results merely in the constitution of a group or class characterised as possessing two attributes in common.

inquiries, and relatively more apparent. Syllogistic proof, on the other hand, is more stringent, and more efficacious in establishing a scientific conclusion or position.

Aristotle's mode of dealing with induction, in so far at least as any specific process is designated by that term, seems on the surface to diverge widely from modern logical theory, and we look in vain in his analytical researches for consideration of the methods of observation and experiment which has come to be recognised as the essential portion of a doctrine of inductive reasoning. Yet it may fairly be argued that in modern theories the term induction is used with great laxity, so as to cover either all processes connected with scientific method or some one special feature of scientific reasoning, and that the difference between the Aristotelian and modern views lies mainly in the matter, not in the form, of the process. For there are numerous hints in Aristotle respecting scientific procedure,[1] and, if we consider what is peculiar to modern views, we shall find that it consists mainly in the increased fulness and complexity resulting from long-continued scientific research. Our modern logic of induction has profited mainly by the general advance of scientific method, and tends to increase as these methods, by constant contact with facts, become more refined and accurate. The additional cautions or limitations which we now introduce into our statement of the principles of inductive research concern not so much the form of inductive proof as the character and modes of obtaining evidence which is to satisfy the canons or rules of proof. Such limitations become apparent only through

[1] See, for example, the discussions in *Topica*, i. 17-18; ii. 10-11, on similarity; in the *Post. Anal.*, i. 13, on deductive and inductive methods; in *Post. Anal.*, ii. 13, on the formation of definition; and in *Post. Anal.*, ii. 12, 14-18, on the relation of cause and effect.

actual scientific progress, not by analysis of the form of scientific proof.

21. To Aristotle, as has been above said, proof is essentially syllogistic or deductive in character. Not every syllogism is an apodictic proof, but all proof is syllogistic. For proof or adequate knowledge is reference of effects to their causes, and the cause is the general element, τὸ καθόλου, which forms the middle term in apodictic proof. Now proof by means of the cause or reason implies the existence of the cause; the inquiry why a thing is is useless unless we know or assume that the thing is. If it exists, then the cause or reason of its so existing is that which gives it a definite character or position; it is, in technical phraseology, the form of the thing. But the form of the thing, regarded apart from the material, accidental element essential to its concrete existence, is that which we express in a definition. Proof and definition are thus most closely connected. The *terminus* to which proof tends, not realised in all cases of proof but certainly in the most perfect, is the definition; and, besides, if we closely examine proof, and find that ultimately we can force back the chain of middle terms up to certain ultimate, primary universals, disclosed by νοῦς, and that the nature of these primary universals is stated in their definition, we see further that definition is connected with proof as the *terminus* from which proof starts.

The exposition of definition is thus the crowning portion of Aristotle's theory of apodictic method.[1] In it we have

[1] It does not seem necessary here to consider in detail the peculiarities of apodictic as these are laid out in the first book of the *Post. Anal.*, nor to deal with the doubts raised regarding definition and proof in the first chapters of the second book. The substance of

brought into close, though not explicit, relation, the fundamental notions on which his logic rests—the notions of the essence, universal, genus and specific difference. Definition, as concerned with that which is involved in demonstration, the ground or reason, is, in cases where the reason and consequent are separable, the sum of the demonstration; it is the compressed statement of the connection between a subject and the attribute demonstrated of it, *i.e.*, in a syllogism of the first figure, the major term.[1] Frequently a definition merely states the demonstrated attribute in relation to its subject, without indicating the rational link.[2] Such definitions, however, are defective, just as the conclusion of a syllogism, if taken *per se*, is defective.[3] A genuine definition is the statement of the essence, which in mediated notions is the cause or middle term of the demonstration, in immediate notions is directly assumed.[4] A

these difficult chapters can be readily summarised. If definition be taken as a finished result, it seems to stand in no relation to proof, and indeed it is hard to discover how it comes about at all. For definition supposes that which is implied in proof, the existence of the thing defined, and, moreover, it is in a special sense a unity, containing no distinction of subject and predicate, whereas such distinction is of the very essence of a demonstrated proposition. Neither in province, nor in method, nor in result do definition and proof coincide. All this follows, however, from an abstract separation of the form or essence of the thing defined from the concrete nature of the thing. The essence is not to be taken apart; the definition does not pre-exist as a given fact. The essence is the reason of the fact, and is only discoverable when there is the recognised distinction of fact and reason of the fact. We must consider definition in the same manner as being involved in and resulting from the genesis of scientific knowledge.

[1] *ἀπόδειξις θέσει διαφέρουσα*, *Anal. Post.*, i. 8, p. 75b 32.

[2] *συμπέρασμά τι ἀποδείξεως*, *ibid.*

[3] *De Anima*, ii. 2, p. 413a 13 *sq.*

[4] *ὁ δὲ τῶν ἀμέσων ὁρισμὸς θέσις ἐστὶ τοῦ τί ἐστιν ἀναπόδεικτος*, *Anal. Post.*, ii. 10, p. 94a 9.

merely nominal definition or explanation of what a name signifies is but a preparatory stadium in the progress towards real, genetic definition.

Definition, then, like demonstration, rests on the essential or rational ground, the notion of the thing. The rational ground or notion has its empirical aspect; it determines a class, and thus, just as in demonstration we may have forms of reasoning based primarily on the empirical details, so in framing definitions we may proceed from the empirical class, and may formulate rules for defining which bear special reference to the genus or body of individuals. In such procedure there is always involved the general idea of the essence or notion as the determining universal, and without this general idea the subsidiary methods, induction and division, do not yield scientific definition.

To frame a definition, then, *i.e.*, to discover the elements whose combination as an essential unity makes up the notion of the things defined, we select the predicates belonging to the things in question, but also attaching to other species of the same genus. The combination of such predicates which is not found in any other species, which is, therefore, reciprocable with the essence or form of the species, is its definition. The definition, therefore, contains the genus and the specific attribute (or combination of attributes). Of these elements, the genus is the least important; the truly essential factor is the specific difference, and, in order that our definition should be ultimate, we must follow out the line of specific difference by which a genus may be divided until we reach a final, irreducible characteristic or group of characteristics, constituting a lowest species (or natural kind, if one were to employ a term made current by J. S. Mill).

The systematic following out of the specific differences is

logical division; the critical comparison of points of similarity in species of the same genus, so as to obtain a higher generality, has no special title accorded to it, but it resembles the Socratic and Platonic induction (συναγωγή). Division preceeds on the oppositions actually found in nature; and though, doubtless, the division by dichotomy has formal advantages, it has not, as a process of real cognition, any supreme value. The negative as such is the inconceivable, and presents nothing for cognition.[1] And division is not dependent on exhaustive knowledge; it is not necessary that, in order to recognise A as distinct from B, we should know the whole universe of possible objects of cognition. A and B may be recognised as identical or distinct in essence, even though they at the same time possess distinct or identical accidental marks. Knowledge, in other words, turns upon the essential, not upon the numerical universal.[2] It is only needful, then, that in the systematic process of indicating the elements of definition, all must be included that concern the essence, that the order must be strictly from determining to determined (or from more abstract or general to more concrete or special), and finally, that the enumeration be complete. The final division or species reached is the notion of the thing, and its expression is the definition.

22. The analytical researches thus manifest themselves as a real theory of knowledge and as forming an integral

[1] Just as the ὄνομα ἀόριστον is said to have no significance save as the summary of a proposition, while a negative proposition has significance only in regard to the corresponding positive.

[2] The reference is to a theory advanced by Speusippus; see Prantl, i. 85. Aristotle here touches on a logical problem which has troubled many logicians. It is the same difficulty that arises when the question of plurality of causes is considered.

part of the Aristotelian system. Logical relations are throughout conditioned by the characteristics of the Aristotelian metaphysical conception, and the distinction of the formal or technical from the real in cognition has no place in them. No point is more frequently insisted on by Aristotle than the impossibility of deducing any scientific principles or results from the fundamental axiom of thought, the law of non-contradiction. In the Aristotelian system this axiom appears simply as the generalised expression for the peculiar characteristic of thought, its potentiality of truth or falsehood. Such potentiality accompanies thought throughout, and is the mark of its subjective character, but the actuality of thought is something quite distinct, and is only realised through the various processes whereby the world of fact is apprehended. Beyond a doubt knowledge has a general aspect; and there is thus possible a general theory of knowledge, but this is not to be regarded as merely a development from the fundamental axiom of thought. It is the general statement of what constitutes actual cognition, and thus refers on the one hand to the ultimate properties of that which is to be known, on the other hand to the qualities of knowledge as a subjective, though not the less real, fact. For to Aristotle subjective has not the sense which it may be said to have assumed in modern logic, mainly through the Kantian analysis. The activity of thought which realises itself in the consciousness of the individual is not a mere formal process of apprehension, mirroring or depicting reality that is totally distinct from it. It is a reality, one aspect or phase of the total sum of things, and its development is a real process correlative with the development inherent in things as a whole.

At the same time it is impossible to overlook the difficulties which attach to the Aristotelian conception,

and the consequent obscurities or perplexities in his logical researches. To remain always true to the fundamental conception of thought as one factor or phase in things, to trace its forms in such a mode as never to lose sight of its essential correlation to the development of reality, is in itself the hardest task for any thinker, and presupposes a more completed metaphysic than is to be found in Aristotle. Some of these difficulties may be briefly noted, as they form the turning-points of certain later doctrines. The judgment or proposition is taken as the initial, the simplest phase of the activity of thought, and so as having the simplest relation to things. But the distinctions of things which are subjectively seized in the judgment are too much regarded as given facts, and Aristotle is thus involved in a difficulty respecting the import, the truth or falsity, of the judgment. The presence of this difficulty is specially discernible when he attempts to deal with the temporal reference in the judgment, with the doctrine of opposition, and with the nature of modality. Thus, he notes that the verb, the essential part of the predicate, has a temporal significance, but he also notes that in universal judgments there is no reference to any specific time, and also that the copula, the verb *is*, has no existential meaning. He is thus driven to the enunciation of a view, common among recent logicians, that the judgment is a reflective or critical act, pronouncing on the truth or falsity of a contemplated separation or conjunction of facts, while, on the other hand, the very contemplation of conjunction or separation has appeared as the essence of the judgment. So, in dealing with opposition, he distinguishes contradictories from contraries, and is inclined to refer the second to the given nature of facts, wherein extreme oppositions of members falling under the same genus are presented. Modality, likewise, he treats

confusedly, for the assignment of the modal relations to the predicate does not sufficiently determine their place in a theory of judgment, nor explain the relation in which they stand to the judgment as the simplest activity of thought.

Further, in dealing with the quantity of judgments, Aristotle is perplexed by his own theory of what constitutes generality. He is compelled to throw together universal judgments of a totally distinct kind—empirical and rational, as one may call them,—and though the underlying view that empirical universality is the expression of, and is dependent on, rational connection is made sufficiently clear in the doctrine of proof, it is not carried out to its consequences in the doctrine of judgment. Finally, to note only the crowning difficulty, the theory of proof and of definition turns upon the nature of the essential connection of attributes in a subject, but the explanation of essence is precisely the lacuna in the system. Indications of a theory of essence are not wanting, but it does not seem possible so to unite them as to form a consistent whole. The greatest obscurity still hangs over the fundamental part of the system, the nature of the πρῶτα which are apprehended by νοῦς, of the specific relation of attributes καθ' αὑτά to their subjects, and of the ἴδιαι ἀρχαί from which particular sciences start. That the πρότασεις ἄμεσοι, so frequently adduced as integral parts of proof, are analytical judgments[1] cannot be accepted without such qualifications as to render the use of such a term misleading; but what their precise nature is remains in the Aristotelian system undetermined.

[1] As Zeller will have it; see *Ph. d. Gr.*, ii. 2, 191, *n.* Doubtless Aristotle does define an essential attribute as being one contained in the subject or one of which the subject notion is an integral part, but this relation of *entering into the definition* is not to be identified rashly with the modern view of the analytical relation of subject and predicate.

III

LOGIC FROM ARISTOTLE TO BACON AND DESCARTES

23. The long history of philosophic thought from Aristotle to the beginning of the modern period furnishes no new conception of logic so complete and methodical as to require detailed treatment, but exhibits alterations in special doctrines, additions, and new points of view numerous enough to account for a certain radical change in the mode of regarding logic which is, for our present purpose, the only interesting feature. This change may perhaps be expressed not inaccurately as the tendency towards formalising logic. Gradually logical researches came to have their boundaries extended in one way by the introduction of new matter, and narrowed in another by restriction of logical consideration to one special aspect of knowledge. Much in the history of this movement still remains in obscurity, but the general result is sufficiently clear.

The periods into which the historical development of logic throughout this long interval may be naturally divided, with their main characteristics, are the following :—

(1) *The Peripatetic School*, represented by Theophrastus and Eudemus, following in the main the Aristotelian

tradition, but deviating in certain fundamental respects, and on the whole treating the matter of logical research as though it were separate from and independent of the theory of knowledge as a whole. To this school is due the distinct recognition of the hypothetical and disjunctive proposition and syllogism, and the more complete enumeration of the possible valid modes of categorical reasoning. In both cases the additions are made to turn upon purely formal considerations. The hypothetical and disjunctive judgments are treated as given varieties, to be discerned in ordinary language and expression, not as resting upon any fundamentally distinct principle or activity of thought.[1] The addition of five indirect moods to those recognised by Aristotle as belonging to the first figure proceeds on the purely formal ground of difference in position of the middle term in the two premisses.

(2) *The Epicurean and Stoic Logics.* — Of these the Epicurean presents no points of interest. Logic, in their conception, was merely a practical theory of knowledge. The Stoic logic, on the other hand, is the first example of a purely formal doctrine based on and associated with a thoroughly empirical theory of cognition. In essence the Stoic doctrine is identical with that of Antisthenes, above noted, and it is interesting to observe that, under the purely nominalist theory, logic becomes almost identical with the doctrine of expression, or rhetoric. The theory of naming, and that of the conjunction of names in propositions, are the fundamental portions of the body of logic. Naturally

[1] The nature of hypothetical inference and its law are recognised with the greatest distinctness by Aristotle. From his theory of essence as causal nexus, any distinction of kind between an apodictic (categorical) syllogism and a hypothetical of the type contemplated by later logicians was impossible and needless.

the Stoic logicians tended to increase the bulk of logic by introducing numerous distinctions of language, and by signalising varieties of judgment dependent on varieties of verbal expression.

(3) *The acceptation of Logic among the Romans.*—Here there must be distinguished the quasi-rhetorical logic, such as is found in Cicero, which is altogether Stoic in character, and the Aristotelian logic, as developed by Boetius with the additions of the later commentators. In Boetius one notes specially the technical or formal character of the treatment, which was of special importance historically, from the fact that the earlier scholastic writers derived their main knowledge of logic from certain of the treatises of Boetius.

(4) *The Scholastic Logic.*—On the details of the scholastic logic it is not necessary to enter, but there must be noted the following points as of interest in determining what may well be called the current conception of the Aristotelian logic in modern times. The earlier scholastics, in possession of but few of Aristotle's writings, added nothing of importance to the body of logical researches, and the permanent subject of discussion, the nature of universals, did not, through any of its solutions, affect the treatment of logical doctrines. The introduction of the body of the Aristotelian writings was contemporaneous with the introduction of the Arab writings and commentaries into western Europe, and there grew up therewith a more developed treatment of what may be called the psychological element of logic. The logic of the later scholastics is characterised by two points of interest, historically unconnected, but having a natural affinity—the one, the introduction of an immense mass of subtle distinctions, mainly verbal, making up the body of the *Parva Logicalia;* the other, the influence of the

nominalist conception of thought.[1] The peculiarity of the nominalist view is the severance of immediate apprehension from discursive thought, the assignment of all matter of knowledge to the one, and of all form to the other. But form, under this conception of discursive thought, can be found only in the generalising function of signs or names; accordingly the fundamental processes of logical thought are regarded as so many modes of application of names. The later nominalist logicians were thus naturally led to the expenditure of immense subtlety and diligence on the thorny problems of the *Parva Logicalia*, while at the same time the peculiar inner difficulty of the theory became apparent as its consequences were worked out.

(5) *The Reaction against Aristotelianism and the Humanist Modification of Logic.*—Little of positive value for logical theory is offered by the numerous works representing this stage of historical development. Valla, Agricola, and Vives, with much good criticism in general spirit and detail, present a rhetorico-grammatical logic that resembles most closely Cicero's eclectic reproduction of Stoicism. Ramus, the only logician of the period with historic renown, contributes really nothing to the history of logic, his innovations consisting mainly in the omission of the most valuable portions of the genuine Aristotelic logic, the insertion of practical and interesting examples, and finally rearrangement or redistribution of the heads under which logical doctrine was expounded. The Ramist school, most numerous and flourishing, produced no logical work of the first importance.[2]

[1] The first of these is no doubt, as Prantl has laboured to prove, Byzantine in origin, but it still remains doubtful whence the Eastern logicians draw. The most probable source is the Stoic writings.

[2] See note C, p. 168.

The net result of this whole period was the severance of a certain body of doctrine, formal in character (the theory of second intentions), from theory of knowledge generally, and from all the concrete sciences. The boundaries and even the functions of this doctrine remained unfixed, for difference regarding fundamental points of extra-logical theory led to difference in mode of treatment, as well as to difference in conceptions of the end and value of logic.

IV

LOGIC OF BACON AND DESCARTES

24. Modern reform of logic, by which may be understood the attempt to place logical theory in a more close and living relation to actual scientific method, begins with Bacon and Descartes. To both the scholastic logic presented itself as the essence of a thoroughly false and futile method of knowledge. Neither had the acquaintance with the genuine Aristotelian system requisite in order to distinguish the elements of permanent value from the worthless accretions under which these had been buried, and, as a natural consequence, the views of both have a far closer resemblance to the Aristotelian doctrine than might be imagined from the attitude of opposition common to them. Both thinkers were animated by the spirit of reformation in science, and both emphasise the practical end of all speculation. For both, therefore, logic, which to neither is of high value, appeared to be a species of practical science, a generalised statement of the mode in which intellect acquires new knowledge, in which the mind proceeds from known to unknown.[1] But such a conception of logic is, if the expression be permitted, formal: that is to say, the actual province of logic is not determined thereby, but awaits

[1] Comp. *De Aug. Sc.*, bk. v. chap. 1, 2; *Princip. Phil.*, pref.

determination from the further idea of the nature of knowledge and the ultimate constitution of that which is to be known. When this point is reached, a radical divergence presents itself between the views of Descartes and Bacon, consequent on which appears a radically divergent statement of the main processes and methods of logical theory.

To Descartes the ideal of cognition is the mathematical, that in which from assured and distinct data we proceed by strict sequence of proof to determine accurately and completely the nature of complex phenomena. Such an ideal, extended so as to embrace knowledge as a whole, dominates the whole of the Cartesian speculation, and, as in the case of the Socratic doctrine of knowledge, is the ground of the Cartesian doubt. Perfect certainty, *i.e.*, clearness and distinctness of principles, logical consecutiveness of deduction from them, and exhaustive enumeration of details—such are the characteristics of completed knowledge. There follow naturally therefrom the main processes of knowledge: *intuition*, by which the simple data and axioms are apprehended; *induction*, or exhaustive enumeration of the elementary factors of any phenomenon; *deduction*, or determination of the complex as the necessary result of the combination of simple factors. To the processes of induction and deduction, when viewed more generally, the titles analysis and synthesis may be given.[1] On other portions of logical theory Descartes does not enter, and the text-books of the Cartesian school, even the celebrated Port Royal logic, do little more than expound with some freshness such of the older material as seemed capable of harmonising with the new conception.

[1] See *Regulæ ad directionem ingenii*, Nos. 2, 3, and especially 7. The celebrated rules of speculation (*De Methodo*) are only a more popular statement of the same processes.

Two things only require note in respect to the Cartesian logic, apart from its freshness and completeness : the one is the obscurity which hangs over the nature of intuition ; the other is the step in advance of the scholastic logic effected in the assimilation of deduction to synthesis. As regards the first, the criteria laid down by Descartes—viz., clearness and distinctness—are unsatisfactory and ambiguous. It is evident that he implied under these clear and distinct recognition of *necessity* in the data or principles, but the nature of this necessity is never made clear.[1] As regards the second, it was of importance to signalise, as against the scholastic view, that the universal in thought or reasoning was not only of the nature of the class notion, that genera and species were not the ultimate universals, but were themselves secondary products, formed by reasoning, and based upon essential connection of facts. In this Descartes was but returning to the genuine Aristotelian doctrine, but his view has all the advantage derived from a truer and more scientific conception of what these connections in nature really are.[2]

[1] His ultimate standard is, no doubt, necessity for a thinking subject. Whatever is so connected with the existence of the thinking being that without it this existence is incomprehensible, is necessary. But to apply this ideal to any proposition save the first, the *Cogito ergo sum*, is for Descartes the fundamental difficulty of his philosophy.

[2] It is remarkable, however, that neither in Aristotle nor in Descartes do we get many indications of any other kind of essential connection than that presented in the relations of geometrical or mathematical quantity. To both the type of exact reasoning is the mathematical. The difference between the two philosophers is but one example of what was previously remarked : that precise determination of the significance of processes of thought is dependent largely, if not mainly, on general advance in scientific knowledge. Descartes' conception of nature and of natural processes was in advance of the Aristotelian, and his conception of the method of thought by which knowledge is obtained is by so much clearer and profounder.

25. What is peculiar in the logic of Bacon springs likewise from the peculiarities of the underlying conception of nature. The inductive method, expounded in the *Novum Organum*, is, however, only part of the Baconian logic, and, since it is commonly regarded as being the whole, a brief statement of what Bacon included under logic may here be given.

Viewing logic as the doctrine which deals with the use and object of the intellectual faculties, Bacon divides it (in this approximating somewhat to the extended division of the Stoic logicians) into (1) the art of inquiry or invention, (2) the art of examination or judgment, (3) the art of memory, and (4) the art of elocution or tradition. The third and fourth divisions are unimportant; the first and second might be called respectively the theory of the acquisition of knowledge and the theory of evidence or proof. The art of inquiry is subdivided into the art of the discovery of arts and the art of the discovery of arguments. The second of these Bacon regards as identical with the *Topics* of the Greek and Roman dialectic, and therefore as of comparatively slight value. Of the first there are two main branches: (A) *Experientia Literata* and (B) *Interpretatio Naturæ*. The art of judgment has two sub divisions: the examination of methods of reasoning — induction and syllogism — which resembles the older analytic; and the examination of errors of reasoning— whether these be sophistical, *i.e.*, the logical fallacies of the older doctrine, or errors of interpretation to be removed by careful criticism of scientific terms, or arising from erroneous tendencies of the mind (the doctrine of *Idola*)—which resembles the older treatment of *Elenchi*.

The peculiarity of the Baconian logic, then, must be sought in the processes included under the art of discovering

arts or knowledge. Among these the syllogism is not included. It is a process with no practical utility; it involves premisses of which the truth is simply assumed, and consequently its conclusions can have no validity beyond that of the premisses; it affects to determine the particular from the general, but in fact nature is much more subtle than intellect, and our generalisations, which are but partial abstractions, are quite inadequate to afford exhaustive knowledge of the particular; it throws no light upon the essential part of cognition as a process information, viz., the method by which we are to obtain accurate notions of things, and judgments based on these notions. Moreover, the deductive or syllogistic procedure favours and encourages the tendency to rash generalisation, to the formulation of a universal axiom from few particulars, and to the uncritical acceptance of experience. If syllogism exist at all, there must be a prior process, that of generalising by rigid and accurate methods from experience itself. Syllogism is not entirely worthless. It is of particular service in some branches of science (*e.g.*, the mathematical), and generally may be employed so soon as the principles of a science are well established; but it is a subordinate and secondary method.

The art of discovery, then, is the method of generalising from experience. What this method shall be depends entirely on the thinker's conception of experience. Now Bacon's conception is perfectly definite. Observation presents to us complex natures which are the results of simpler, more general forms or causes. From the complex phenomena these forms are to be sifted out by a methodical process of analysis and experiment. A general proposition is one stating the connection between complex natures and their simple forms or causes; it is, therefore, the result of a

graduated process. No doubt there may be generalisations based only on an ingenious comparison of the complex phenomena as they are presented to us; such a process Bacon calls *Experientia Literata*, and the maxims recommended for it much resemble the ordinary methods of experiment; but truly scientific knowledge is only to be obtained by the complete inductive method.

The characteristics of this inductive method follow at once from the nature of the object in view. The form which is sought can be detected only by examination of cases in which the given complex effect is present, in which it is absent, and in which it appears in different degrees or amounts. By a critical comparison of these cases we may be able to detect, and, were the enumeration exhaustive, we must infallibly detect, by process of exclusion or elimination, a phenomenon constantly present when the effect is present, absent whenever the effect is absent, and varying in degree with the effect. Such a phenomenon would be the *form* in question—the cause of the given fact or attribute. Exhaustive enumeration is, of course, an ideal, and therefore the method of exclusion can never be perfectly carried out; but all additional aids have significance only as supplying in part the place of exhaustive enumeration. We may, on the basis of a wide examination, frame a first generalisation (*first vintage* as Bacon metaphorically calls it), and proceed to test its correctness by carrying out the critical comparison with it in view. Or we may, under the guidance of our leading principle, take advantage of certain typical cases presented by nature, or force cases by experiment, in such a way as to supersede the enumeration. There are *prerogative* instances, critical phenomena, helpful in discovery of the cause of a phenomenon. Of other *adminicula*, or aids to induction, only the

titles are given by Bacon, and it would be hazardous to conjecture as to their significance.[1]

The Baconian logic, then, or at least what is peculiar to it, is thoroughly conditioned by the peculiarities of the Baconian metaphysic or conception of nature and natural processes. As to the novelty of the logic, this to us does not appear to lie in the mere fact that stress is laid upon induction, nor do we think it correct to assign to Bacon the introduction of the theory of induction as an integral portion of logic. But it consists in the new view taken of what constitutes the universal in thought, a view which may be inadequate,[2] but which colours and affects every process of

[1] *Nov. Org.*, ii. 21. In addition to prerogative instances there are mentioned—supports of induction ; rectification of induction ; variation of the investigation according to the nature of the subject ; prerogative natures ; limits of investigation ; application to practice ; preparations for investigation ; ascending and descending scale of axioms.

[2] A word may be permitted on the objection so frequently raised against Bacon's method of induction, that its mechanical character not only fails to correspond to the actual process of discovery, but demands a wholly impossible enumeration of instances. It is not a little remarkable that this objection should be raised by any logician who accepts the empirical theory of knowledge, who holds therefore that, except in the case of facts immediately apprehended, we have only probability as our guide. For this is the very foundation of Bacon's doctrine. The exhaustive enumeration (*i.e.*, the immediate apprehension of all facts) is an ideal, but whatever falls short thereof, is not exact knowledge, and must be dealt with by other methods. The tables of presence, absence, and degree are no more the whole of the Baconian theory of induction than are the four experimental methods the whole of Mill's doctrine of inductive proof, though a similar misconception is not infrequent in respect to the latter also. Bacon is perfectly conscious of this defect in his method : he advocates the use of hypothesis, though it is hardly surprising that, with certain current hypotheses before him, he does scanty justice to this potent instrument of research ; and almost the whole exposition of the inductive method is concerned with one of

thought, and therefore every portion of logical theory. It is but a consequence of Bacon's narrow view of the essence of syllogism that he should set induction in opposition to deduction, and regard syllogism as of service only for communication of knowledge. His inductive methods are throughout syllogistic in this respect, that they like all processes of thought involve the combination of universal and particular. Experience is interpreted, that is to say, viewed under the light of a general idea or notion.

the processes supplementary to and necessitated by the impossibility of realising exhaustive enumeration. The names of the other supplementary processes contemplated by Bacon at least suggest many of the methods which have been brought forward in recent logics as antithetic to the mechanical induction of the *Novum Organum*.

V

LOGIC ON THE BASIS OF PSYCHOLOGICAL EMPIRICISM: LOCKE, HUME, MILL, CONDILLAC

26. The universal element in thought which is recognised by Bacon as present received from him no special treatment. His theory of the nature of knowledge offered no explanation of the origin, significance, and validity of the notions involved in inductive procedure. The *Essay concerning Human Understanding*, which carries out in the domain of inner experience the practical tendency of the Baconian method, supplied from the point of view of individualism the metaphysical theory common to both, a certain psychological theory of the universal element in knowledge, and thereby afforded a new foundation for logical doctrine. The *Essay* contains, in an unsystematic fashion, much that bears directly on logic (*e.g.*, the whole discussion on names, the classification of the signification of judgments, the criticism of syllogistic argument); but of more importance than these detached and direct portions is the general principle which underlies the whole view of human knowledge. This principle is briefly that of psychological genesis. All the complex facts of knowledge are regarded as mechanical compounds due to the coherence of simple data, the facts of inner and outer sense. It is

true that Locke's effort to carry out the view is full of difficulty and even of contradiction; it is true also that the specifically logical processes of judging appear, without any warrant, as reflective acts exercised upon the materials furnished by sense, and that generally there is no attempt made to push the ultimate explanation further than to the very complex fact of an individual mind endowed with a multiplicity of powers, by means of which it brings into the isolated impressions of experience the order and logical coherence which are the very characteristics of knowledge. Nevertheless, the method of Locke is that which underlies and determines all the logical work of one very important school of logicians.

It is not needful to enter into details of Locke's own contributions to the foundation of logic. But it may be pointed out that from his position there were two possible lines of development. In his view the primitive impressions, the facts of inner and outer sense, were in themselves primitive facts of cognition; they were cognitions (it is the very essence of Locke's method to identify a simple impression of sense with the knowledge of a simple sense fact). The processes of abstraction, comparison, *i.e.*, judging and reasoning, were exercised upon their data, and these products were, in consequence, of a secondary and, so to speak, artificial character. It was natural that a thinker who identified impression of sense with knowledge of a sense fact should maintain that the secondary formations of thought (general ideas, general propositions, syllogism) were not indispensable for cognition; that we could and did reason from particulars to particulars. At the same time Locke admitted the secondary processes as having actual existence, and in one important case (that of the judgment of coexistence, with which may be taken

the idea of substance and of real relation) seemed to allow that in judgment something was added to the primitive data. It was possible, then, for development from Locke's position to proceed either by offering an explanation of the added elements, which should be in stricter harmony with the fundamental doctrine of psychological genesis, or by throwing them entirely out of account and concentrating attention on the primitive data as the only materials of cognition. The first is the line taken by Hume, which finds its logical completion in Mill; the second is the line taken by Condillac.

Hume has an easy task so long as he merely subjects Locke's position to negative criticism; for the added elements, the ideas of substance, relation, cause, &c., are clearly inept and defenceless when the facts to be linked by them are already contemplated as so many completed, isolated cognitions. But where connectedness of cognition is in question, and where some explanation is demanded of the relations which seem to supply the universal rule in thinking, Hume's task is not so simple, and his final answer that these relations are psychological growths or products of association is neither satisfactory in itself nor quite in keeping with other portions of his doctrine. In Hume, however, we find the first thorough-going attempt to construct a theory of knowledge on the basis of psychological empiricism or individualism, and the first contributions to a doctrine of inductive proof as portion of this more comprehensive theory.[1] Briefly, so far as logic is

[1] It seems hardly necessary to call attention to the points of similarity between Hume's expressions on logical questions and the allied opinions of Mill. But there may be specially indicated for comparison the classification of kinds of knowledge implied by both (intuition or immediate apprehension, proof, and probable reasoning), and Hume's remarkable, thoug brief, statement of the rules for

concerned, Hume offers as explanation of the universal in thought association of ideas, but does not treat of logic specially or in detail.

The complete statement of the theory of knowledge from the psychological point of view is that contained in Mill's *System of Logic*. This well-known work, which has contributed much of value to general logical discussions,[1] is a complete exposition of all the processes concerned in the formation of knowledge, from the individualist standpoint. It is therefore to a large extent polemical, or, at least, animated by the spirit of defence against attacks on the fundamental position. The purely expository portion, however, contains the logical theory of psychological empiricism in a form which may fairly be regarded as final.

The aim of the work is the exposition of the theory of knowledge. Now knowledge, the term being taken in a wide sense, is characterised by one quality mainly, viz., evidentiary force. For every item entering into the sum of our beliefs at any moment, immediate perception being discounted, there may be reasons advanced, adequate or inadequate. The exposition of the relations between beliefs and their evidence or ground is logic; and logic is thus in one sense formal, inasmuch as the relations of evidence and belief are general, not dependent on the special nature of the facts believed, and in another sense

reasoning with regard to causation. These rules contain in essence the inductive methods. The matter, however, is only of historic interest, for the originality of Mill's treatment of the empirical logic is in no way affected by similarity between his ultimate philosophical views and those of Hume.

[1] The treatment of logical problems, such as the significance of the proposition, the theories of division and definition, is always instructive. But upon matters of detail the present discussion does not profess to enter.

real, in that knowledge is conceivable only in strictest relation to the things known.

Now, the exposition of the general nature of grounds of belief, while it implies a statement of the modes in which data and conclusions are expressed, and a reference to the nature of that which is expressed,[1] is in fact identical with a theory of the universal element in thought or cognition, and this theory is the essential portion of Mill's logic. It being assumed that the facts with which knowledge is concerned are minds, bodies, states of consciousness, and the relations (coexistence, sequence, similarity) among these states, and that propositions express, therefore, existence, coexistence, sequence, or resemblance, on what is based any inference going beyond a present perception? The propositions which make up cognition, strictly so called, are not mere expressions of momentary states; they are expressions of belief regarding the more or less constant relations of facts. They are, in fact, conclusions. The theory of proposition and of reasoning is one. On what, then, do such conclusions rest?[2]

The warrant for any conclusion based upon experience, and referring to experience itself, can be found only in experience or in some principle furnished by experience. It may be shown that evidence for a conclusion is adequate, if we can compare this evidence with the kind of evidence on which a wider conclusion, frequently or constantly verified, rests. This comparison of particular evidence

[1] The theories of naming and of propositions.

[2] Any references, in the discussion of so fundamental a problem, to empirical constancies, to the universality of extent or fact, as opposed to universality of intent or essence, are beside the mark. Nor is it advisable, in considering Mill's solution, to follow the order of exposition in the *System*, which proceeds by assuming a form of the solution which is to be afterwards justified.

with mere general evidence is the preliminary answer furnished by Mill. But what is the general evidence referred to, and what is the principle founded on it? The general evidence is the repeated experience of constancy of connection among groups of phenomena, and the principle founded on it is that of the existence of uniformity or rather of uniformities in nature. The evidence and the principle are purely psychological in character; that is to say, repeated experience, beginning with familiar cases and extending itself as time goes on, produces, by the natural laws of association, an assured belief that phenomena as a whole, or at least in the main, are connected together in constant, uniform, invariable modes. Such a belief, once established, serves as an ultimate criterion of proof, and as an index for research. We proceed in our investigations in the light of this principle, and the tests by which we estimate the validity of evidence for any particular inference as to uniformity are generalised statements deducible from it. So soon as our evidence is of such a character that, in the case before us, either the inference of uniformity is warranted or the general principle must be held not to apply to this particular case, we have proof as cogent as experience can afford.[1]

The universal in knowledge, then, is this naturally formed assumption regarding the course of nature. The logic of knowledge is the exposition of the modes in which evidence is obtained, of the tests by which its validity is estimated, and of the forms in which evidence and conclusion are connected.

The characteristic features of the subordinate processes

[1] It would have added to the clearness of Mill's exposition of induction (*System of Logic*, book iii.) had the word *cause* been entirely omitted. Nothing but confusion arises from its use.

of proof are at once deducible from this fundamental view. For if the simplest form of inference be, psychologically, the transition effected by association from one particular case to another resembling it, and if the essence of proof consist in comparison of the evidence for any one conclusion with the type of evidence for the general assumption regarding nature (or at least a wider portion of nature), it is evident that syllogism, in the ordinary acceptation of the term (in which it implies a concrete general proposition, a particular subsumed thereunder, and a conclusion), is neither a primitive form of inference nor a valid mode of proof. Doubtless we do in reasoning employ general propositions in order to express the determination of some particulars belonging to the same class; but the general proposition is itself a conclusion, resting on evidence of the kind above described, and the essence of syllogistic reasoning is not the subsumption of a particular under a general in which it is included, but the expression of belief that the evidence for the general proposition is adequate to cover all the particular cases, including those which have not been taken into account in formulating it. The major premiss of a syllogism is the record of a previous induction; and the syllogistic process, bringing forward a new case, is a valuable method for testing the adequacy of the previous generalisation. As to generalisation itself, the basis is evidently to be sought in experience, apprehended by observation and experiment. Did experience present to us isolated phenomena, *i.e.*, phenomena so arranged that enumeration of the elementary constituents, whether antecedents or consequents, were possible, then our inductive procedure must be regulated by those canons or axioms which express the kind of evidence already referred to as establishing uniformity.

These canons or axioms, however, are, like the Baconian method of exclusion, tests for an ideally perfect experience, and they, therefore, only lie in the background of actual scientific procedure, which has to employ other processes both of inference and of proof. For, if we can in no way obtain more than a knowledge of the coexistence of facts, we are unable to bring our evidence into conformity with the inductive canons, save in the ideal instance in which absolutely exhaustive experience both of positive and negative cases is possible. Inferences as to law or uniformity of coexistence must here be based on numerical calculation of probability, and the conclusions present themselves in the peculiar numerical form appropriate to propositions of probability. Further, if the phenomena under investigation be complex, so that the canons of neither observation nor experiment are immediately applicable, the process of investigation must of necessity be the combined method of analysis and synthesis: analysis, aided by hypothetical conjecture, formulating such general laws of elementary factors as are known or presumed to exist in the case in question; synthesis, combining these laws and calculating with greater or less numerical exactness, according to the nature of the matter, the probable combined effect — the whole tested by critical comparison of the calculated result with the actual phenomena. Here, as one can see, syllogistic procedure appears in its true scientific aspect as the form of thought by which we pass from the simple to the more complex, from the elementary essence or cause to the complex accident or effect. The elementary causes, no doubt, have no more cogent evidence than that which can be afforded by experience viewed in the light of our psychological assumption of uniformities; nevertheless the whole procedure of scientific investigation

is recognised as being essentially of the type sketched in somewhat imperfect outline by Aristotle.

So far, then, as the logic of Mill is concerned, and apart from the undeniable richness and completeness of knowledge with which the various processes are treated, we note but one fundamentally new feature, namely, the explanation offered of the universal element through which alone perceptions are raised into cognitions, through which alone reasoned knowledge is possible. It is the only explanation possible on the basis of psychological individualism; its value, and therefore the value of the systematic deductions from it, must depend on the accuracy and coherence of the psychological or metaphysical theory on which it is founded.

27. It was possible, however, to proceed by another route from the position taken up by Locke. If it be held that the elementary impressions, mechanically regarded as somehow arising in mind, are in themselves cognitions, then it is possible to view them as containing in themselves all possible cognition. In other words, we may confusedly identify the proposition that knowledge does not extend beyond the field of experience with the very different proposition that the only items of knowledge are the isolated impressions which appear to make up experience. If this identification be accepted (and the conception involved is precisely that underlying all consistent nominalism from Antisthenes downwards), then the only processes requiring to be taken into account are those whereby clearness and distinctness are introduced into our (possibly) vague perceptions. For these processes analysis is an adequate title. All knowledge, *i.e.*, whatever is characterised by clearness, definiteness, consequence, is the analysis of what is given

in isolated perceptions. Each perception is itself and is only itself; no judgment is possible save that of identity. In other words, if there be judgment at all, it can consist only in the assertion that the unanalysed perception is identical with that into which it is analysed, and as each perception and each analytic portion of a perception may be signified by an arbitrary sign (name or other hieroglyphic), judgment is essentially an affair of naming, a declaration that different names are identical or belong to the same perception. Reasoning is simply the transition from one identity to another—a more developed result of analysis. Scientific or real knowledge is an accurately framed system of signs, *i.e.*, a collocation of signs which expresses precisely the results of the analysis of complex perceptions. Logic, under this doctrine of knowledge, is merely a statement of the various modes in which analysis is carried out, of the ways in which names are applied, and of the forms in which names are combined. Such is the theory of logic presented by Condillac.[1]

[1] See *Langue de Calcul; Art de Penser;* and *Logique. Cf.* Laromiguière, *Leçons de Philos.*, i. pp. 5-43; and Robert, *Les théories logiques de Condillac*, 1869.

VI

LOGIC ON THE BASIS OF METAPHYSICAL PSYCHOLOGY: LEIBNIZ AND HERBART

28. One development from the psychology of Locke has thus appeared as an extreme formalism, which if carried out consistently must needs assume the aspect of a numerical or mechanical system of computation.[1] It is remarkable that a very similar result was reached by Leibniz, a thinker who proceeded from a quite opposed psychological conception. The idea of logic, or rather the hints towards a new view of the essence of logical processes, to be found in various tracts by Leibniz, must be taken in close relation to the metaphysical psychology which lay at the root of all that thinker's speculations. We shall probably be able to see that the similarity is due to the presence in both theories of a certain abstract principle, intimately though not necessarily connected with the respective psychologies.

It is not needful to enter into an elaborate survey of Leibniz's metaphysical psychology: the main features which have reference to logical processes alone require to be taken into account.

[1] Such as is hinted at by Hobbes, and as is carried out in the various works of Jevons.

Ultimate reality or substance strictly so called is to be found only in the qualitatively distinct, active, indivisible monad, incessantly changing or developing. Such incessant change, a condition in which there is both difference and identity, is only conceivable if the essence of the monad be regarded as representative activity, as psychical in character. The life of the monad is thus an incessant self-development, in accordance with the laws of its own nature and of the universe. The existence of the monads is dependent on the absolute thought of God, from whom they have sprung, and whose objective thought is the universe. The system of representations which develops in each monad is in one sense subjective (each monad is a universe to itself), in another sense objective in that the development of all must proceed in the strictest harmony with the objective thought of God. Finite monads develop in varied degrees; all of them have psychical life of a kind, but only in the higher monads is there reflective consciousness (apperception) resting upon and implying a certain clearness and distinctness of perceptions. From the very nature of the finite monads, their apperception is subjected to two fundamental laws: identity or non-contradiction and sufficient reason. For as they are finite, each representation must be treated by them as requiring a ground or reason for its reality; as they are conscious of their own identity, no representation can be for them possible which contains contradictory marks. To introduce system into the conscious life of the monad, *i.e.*, to produce science, it is needful to treat every representation as a conditional fact to be referred backwards to distinct, identical grounds or reasons. All truths are ultimately identical, but this identity is not always evident to the finite monads. Only God possesses clear and distinct

knowledge of all propositions: only in Him are all truths identical. To finite intelligences some truths are manifest; others (truths of fact, empirical cognitions) are obscure, and the attempt to trace them back to ultimate principles may be one which cannot be completely realised. The *prima possibilia* may not be attainable for all actual phenomena.

In place of the single perception which in Condillac's logic is the element to be analysed, there appears in Leibniz's view the single consciousness of the monad; in both cases, however, knowledge is assumed to exist there implicitly and to stand in need only of evolution. The methods by which this evolution is to proceed form for Leibniz the substance of a new and all-comprehensive science, "Scientia Generalis," of which the older logic is but a part.

The characteristics of Scientia Generalis are at once deducible from the two general principles which in Leibniz's view dominate all our thinking—the law of sufficient reason and the law of non-contradiction. It must contain a complete account of the modes in which from data conclusions are drawn, and in which from given facts data are inferred; and since the only logical relations are those of identity and non-contradiction, the forms of inference from or to data must be the general modes of combination of simple elementary facts which are possible under the law of non-contradiction. The statement of the data of any logical problem, and the description of the processes involved in combining them or in arriving at them, are much assisted by, if not dependent on, the employment of a general *characteristic* or symbolic art.

The fundamental divisions then of Scientia Generalis, so far at least as its groundwork are concerned (for Leibniz sometimes includes under the one head all possible applica-

tions of the theory), are (1) the synthetical or combinatorial art, the theory of the processes by which from given facts complex results may be obtained (of these processes, which make up general *mathesis*, syllogistic and mathematical demonstration are special varieties); (2) the analytic or regressive art, which starting from a complex fact endeavours to attain knowledge of the data from whose combination it arose.[1]

Of the nature of the second portion only a few brief indications are contained in the logical tracts and in detached utterances in the larger works of Leibniz. When complex combinations are presented, or, in the most general form, when the investigation has to start from experience, from truths of fact, the work of analysis is endless; the regress to conditions is practically infinite. Determination of the necessary data cannot in such a case possess more than probable value, but the probabilities may be estimated according to the rules laid down in the progressive or synthetic art.[2] The logic of probability is thus recognised as an integral portion of the logical system.

Of the first art, the logical calculus in particular, a somewhat clearer and fuller outline is given.[3] The logical calculus implies (1) the statement of data in their simplest form, (2) the assignment of the general laws under which combination of these data is possible, (3) the complete

[1] Leibniz sometimes includes these two under the head of "Ars Inveniendi," and places alongside of this, as first part of Scientia Generalis, "Ars Judicandi," a division resembling that appearing in Bacon; but the "Ars Judicandi" may be thrown out of account.

[2] *Op. Ph.* (ed. Erdmann), pp. 397, 398; *cf.* generally pp. 84, 93, 343.

[3] See specially *Op. Ph.*, pp. 92-114; also the tract "De Arte Combinatoria," *Op. Ph.*, pp. 6-45.

exposition of the forms of combination, (4) the employment of a definite set of symbols, both of data and of modes of combination, subject to symbolic laws arising from the laws under which combination is possible. In the *Fundamenta Calculi Ratiocinatoris* and the *Non inelegans Specimen Demonstrandi*, something is effected towards filling up the first, second, and fourth of these rubrics, but in no case is the treatment exhaustive. The simple data, called characters or formulæ, are symbolised by letters, relations of data by a somewhat complicated and varying system of algebraic signs; for the calculus, or set of operations exercised upon relations given so as to produce new formulæ, no comprehensive system of symbols is adopted. Formulæ, relations, and operations take the place of notions, judgments, and syllogism. The general laws of combination of data are stated without much precision. Leibniz recognises the law of substitution, notes also what have been called the laws of reduplication and commutativeness, but, in actual realisation of his method, employs indifferently the relation of containing and contained or the relation of identical substitution (æquipollence). No attempt is made to develop a complete scheme of possible modes of combination.[1]

At the root of Leibniz's universal calculus, as of Condillac's method of analysis, and generally of nominalist logic, there lies a peculiar acceptation of the abstract law of identity. That a thing is what it is—that knowledge of

[1] It is interesting to note that Leibniz signalises the distinction between the logical and mathematical senses of a whole, and between the distributive and the collective meaning of quantity; that he emphasises the function of the particular judgment as the negation of its opposed universal; and that he approximates to some modern modes of formulating the judgment (*a* is *b*, *e.g.*, he would express as $a = ab$, or *ab* is; no *a* is *b*, as *ab* is not).

a thing is a single, indivisible, mechanical fact, susceptible only of explication or of expanded statement—this is the principle dominating logical theories which in other respects may differ widely. Insistance upon this aspect of knowledge or of the object known is the ground for assigning to thought a function purely analytic, which is the very keynote of nominalism. It is not hard to see, however, that so to view the law of identity is to abstract from all the conditions of actual thinking and knowing, and to throw into the assumed simple fact all the complexity which is afterwards to be discovered in it by analysis. The knowledge of a thing is not to be explained in this abstract or mechanical fashion. Truth does not consist in the empty recognition that a is a, and in the repetition of this unimportant fact, but in the knowledge of the nature of a, a knowledge which essentially consists in relating a to its intellectual conditions, in assigning to it a place in the intelligible world. The identity of the thing with itself is a mere aspect of the complex process whereby the thing is cognised. It hardly requires to be pointed out that the minor forms of the same fundamental view, the various attempts to express the essence of a judgment as the assertion of identity, are open to the same objection. They take an abstract view of the judgment, and regard as the essential fact that which is but an accessory or adjunct or consequence. Difference, to put it in the briefest fashion, is no less essential to a judgment than identity.[1]

[1] Much of the confusion which reigns supreme in many modern works on logic is doubtless attributable to a confusion between the nature of the judgment and the result of a judgment. The result of a judgment is always an increased richness of the subject notion; the subject unqualified and the subject qualified by the predicate are doubtless identical; but it would be absurd to say, therefore, that the function of the judgment is the assertion of this identity.

29. The view of logic put forward by Herbart, from a metaphysico-psychological basis resembling that of Leibniz, agrees in so many respects with that of Leibniz, although containing no reference to the idea of a logical calculus, that it may be placed under the same head. Logic, according to Herbart, is a purely formal doctrine; it has to do only with the modes by which clearness, distinctness, and system are introduced among our ideas. Logical forms, then, the notion, judgment, and syllogism, are not to be regarded as having any metaphysical reference; they are not even to be explained psychologically; they stand on their own footing as explanatory processes exercised about the representations which under their own natural laws fill up consciousness, coming and going within the sphere of apperception.[1] According to this view the whole province of knowledge is excluded from logic, and it is assumed that knowledge is somehow given, mechanically, without the co-operation of processes, if not identical with yet strongly resembling, those recognised as logical. Herbart does not succeed in vindicating an independent place for a purely formal logic.

[1] There is a certain inconsistency in Herbart's view of logic, inasmuch as logic is not the only discipline which has to do with clearing up our ideas. Metaphysics has specially to clear up fundamental contradictions in notions furnished by experience. Logic then must be in some way restricted so as to fall beyond the sphere of metaphysics. Probably the mark of restriction would be found in the given character of the ideas; logic considering them simply as they are and dealing with the relations in which they as given may stand to one another, while metaphysics has to examine the significance of certain notions for our thinking and to clear them up in this particular reference.

VII

THE KANTIAN LOGIC

30. The critical method, which has so influenced general philosophy that all later speculation refers more or less directly to it, has at the same time profoundly modified all later conceptions of the sphere and method of logic. From the Kantian philosophy there spring directly the three most important modern doctrines of logical theory: that which, with many variations in detail, regards logic as a purely formal science, the science of the laws of thought or of the laws under which thought as such operates, and of the forms into which thought as such develops; that which, likewise with many variations, unites logical doctrines with a more general theory of knowledge; and finally, that which identifies both logic in the narrower sense and theory of knowledge with an all-comprehensive metaphysic. Indeed the grounds of distinction between the several doctrines thus brought into connection, and the significance of the terms by which they are expressed, are intelligible only when taken in reference to the Kantian system. The peculiar sense attached to the term thought (from which follows naturally the formal view of logic), the opposition between thought and knowledge (upon which rests the distinction between logic and theory of knowledge), the

ultimate idea of the relation between thought, knowledge, and reality (upon which might be founded a distinction between logic, theory of knowledge, and metaphysics), are all Kantian in origin.

It is matter of history that the critical system was developed mainly from the basis of the Leibnizian logical and metaphysical theories, and it is likewise matter of history that Kant, even in the speculative work which was to so large an extent antagonistic to these theories, remained under the influence of some of their cardinal positions. In particular the view of logical thought as purely discursive, analytic in character, a view never by Kant harmonised with his general system, is a relic, most significant for the development of his logic, from the Wolffian reproduction of Leibniz's philosophy. This historic basis is not to be lost sight of in attempting to acquire a clear idea of the special place and function assigned by Kant to logical theory.

But a brief reference to the general result of the critical philosophy will suffice to introduce the more special treatment of the Kantian logic. Knowledge, or real cognition, which is analysed in the *Kritik* in reference to its origin and validity, appears, when subjectively regarded, as a compound of intuition and thought, of sense and understanding. The isolated data of sense experience do not in themselves form part of cognition, but are only cognised when related to the unity of the conscious subject, when the subject, as it may be put, has consciousness of them. This reflex act, resembling in some respects Leibniz's apperception, or process of uniting in consciousness, is an act *sui generis*, not to be mechanically conceived or explained. Only through its means do representations become cognitions. The forms in which the synthetic act of understanding is carried out

are, as opposed to the intuitive data on which they are exercised, discursive or logical in character. Essentially they are judgments: all acts of understanding are judgments, and, as judgments, they imply a general element with which the particular of sense is combined, and in the light of which the particular becomes intelligible.

In ultimate analysis it appears that no particular, whatever be its empirical character, can become an intelligible fact, save when determined through some specific act of understanding, through combination with some specific notion or general element. Combination of particular and general is thus the very essence of understanding, the mark of knowledge as such. In every item of cognition the same elements may be discerned as necessarily present. The consideration of the ultimate modes of intellectualisation, of the series of acts by which understanding subsumes the particular, draws the particular into the unity of cognition, may be called in a large sense logic. If the consideration be specially directed to the mode in which, by means of this combination, knowledge arises, and therefore include discussion of the wide problem regarding the relation between understanding and objectivity in general (the matter of knowledge taken generally), the special title transcendental logic may be used. But if, concentrating attention solely on the kind of operation implied in understanding, we endeavour to lay out fully the modes in which understanding proceeds in the construction of knowledge, making abstraction of all inquiries regarding the origin, worth, significance of knowledge itself, the consideration is of a more general character, and may receive the title of general logic.[1]

[1] It does not seem necessary to advert more in detail to the divisions and subdivisions of logic drawn out in the *Kritik*, pp. 86-93 (Hartenstein's ed., 1868).

The understanding then, like everything else, works according to laws, the laws of its own nature. If we abstract from all that may characterise the matter considered, and take into account solely the laws according to which understanding must act, we may construct a purely formal doctrine, a theory which is rational both in matter and in form: for the matter consists of the laws of reason, and the form is prescribed by the very nature of reason,—a demonstrative theory, for nothing can enter therein which cannot be shown to have its ground in reason, —a completed theory, for although the matter of thought is infinite and infinitely varied, the modes in which the understanding must operate if unity of cognition is to result, are finite and capable of exhaustive statement,—and a theory developed from its own basis, standing in no need of psychology or metaphysics, but deducible from the mere idea of understanding as that which introduces unity into representations, whether given (empirical) or *a priori* (pure).

Were this the only determination of the province of logic given by Kant, the question which at once arises as to the possibility of any such independent doctrine would receive an easy solution. For it is evident that logic, as a theory of the form of thought, could consist only of a portion of the more general doctrine, by whatever title that be known, in which the nature of understanding as synthetic activity is unfolded. The distinction on which Kant lays stress between matter and form, a distinction employed by all subsequent writers of his school, is ambiguous and misleading. If by matter be meant the particular characteristics of the things thought about, in which sense we might speak of judgments of physical, chemical, grammatical matter, and so on, then to say that logic does not take this into account

is perfectly inept. If logic be a philosophic discipline at all, a theory in any way concerned with thinking, it is at once evident that it can in no way deal with the specialities of any particular science. But this distinction between matter and form is by no means identical with another, lying in the background, and too frequently confused with the first—the distinction of understanding as a faculty *per se* with its own laws, deducible from its mere notion, and understanding as the concrete real act of thinking. What Kant calls the mere idea of understanding, and what in other writers of his school appears as a definition of thought, is really nothing but a reference to what has presented itself in the wider inquiries of the *Kritik* as the complex nature of the synthetic activity of understanding. Kant himself never attempts to deduce from the notion of understanding the varied characteristics of logical forms, and his followers —*e.g.*, Hamilton — when they are consistent, start from concepts as expressing the bare notion of thought, and regard all other forms of thought as combinations of concepts.

But Kant does introduce another element into his treatment of the province of logic, one not original to him, but of the utmost importance for later developments from his point of view. He inquires what kind of relations among the elements of thought can form the matter of logical treatment, and defines these as two in number—(1) formal consequence, (2) non-contradictoriness. By formal consequence we are to understand the relation between a conclusion and its premisses, no inquiry being raised as to the truth or validity of the premisses. By non-contradictoriness we are to understand that, logically, notions, judgments, or reasonings can be subjected to treatment only in regard to the absence of explicit contradiction among the factors

entering into them. Thought, which introduces unity and system into experience, must certainly introduce formal consequence and preserve analytic truth or correctness. Formal logic, then, treats only of these formal qualities of all products of thought.[1]

The detailed treatment of logic, so far as that can be gathered from the very brief summary given in his *Logik*, shows with the utmost clearness how impossible it was for Kant to deduce the forms and relations of thought from the mere notion of understanding, even when coupled with the principles of formal consistency and consequence. Assuming that understanding is the discursive faculty, the faculty of cognising the many particulars through the one concept or notion, Kant deals first with concepts (Begriffe) as general or discursive representations. He is careful to avoid an error into which many of his followers have fallen, that of regarding Begriffe in a mechanical fashion as a specific kind of Vorstellungen, distinguished only by con-

[1] Two at least of the followers of Kant have worked out the system of logic from this point of view—the one, Twesten, in his *Logik, insbesondere die Analytik* (1825), the other, Mansel, in his *Prolegomena Logica*. Mansel recognising the distinction between the two modes of determining formal logic, adopts the second, and is therefore led, in consistency, to define logic, not as the science of he laws and forms of thought, but as the science treating of formal thought, or of the formal element in the forms of thought. In other words, he recognises that the statement of the forms of thought must be introduced into logic *ab extra*, from psychology or what not, and that logic, accepting these, has to consider the formal element (non-contradictoriness) in them. It is well to have the doctrine brought thus to its ultimate issue, for it is thence apparent that there is no independent science called logic, but simply one comprehensive precept, which may be called logical—viz., avoid contradictoriness in thought. Illustrations of the ways in which contradictoriness manifests itself may be offered, and a useful logical praxis may thus be afforded, but these do not make up a science or theory.

taining a few of the marks making up the single intuitions. He rightly notes that cognition proceeds by subsuming the particulars under the common element contained in them, and that the generality of the concept thus rests upon the relation in which it stands, as reflective ground of cognition, to the particulars. The characteristics of concepts, as possessing extent and content, are treated briefly, after the fashion familiar in the more detailed logics of his school.

It is, however, when the doctrine of judgment is reached that the difficulties of his position appear with greatest distinctness. Judgment is defined "as the representation of unity in the consciousness of distinct representations, or the representation of the relation of these, in so far as they make up a concept."[1] But the essential element in the definition — the unity of consciousness or unification of differences in a notion—is thus left so vague and undetermined that it is impossible to deduce from it any classification or any peculiarities of judgments, and possible indeed to proceed on two quite distinct lines of research. The expression, indeed, refers to that which is the fundamental fact in the critical system, the existence of conditions under which only it is possible for detached data of experience to become objects of knowledge for the single conscious subject; and, had Kant been true to the principles of his system, it would then have been necessary to base any classification and treatment of judgment on the enumeration of the functions of unity in conscious experience. In the *Kritik*[2] emphasis is laid upon the function of unity as the essence of the judgment, but it is a well-known historic fact that Kant makes no attempt to justify in its details the enumeration of such functions on which his divisions rest.

[1] *Logik*, § 17.

[2] *Analytik*, § 19.

His followers in the field of logic,[1] misconceiving the real relation of form to matter, interpreted the unity involved in the judgment as being a merely quantitative relation between given notions.[2] There is here involved a twofold error, which has exercised a most pernicious influence on the fortunes of logical theory. For, in the first place, so to view judgment is implicitly to proceed from the assumption of notions as given elements of knowledge, the relations of which are to be discovered by comparison or analysis of what is contained in them. The notion as empirically given thus becomes the fundamental fact; all other forms of thought, judgment, and syllogism are regarded as merely the mechanism by which the content of notions is evolved. Such a doctrine puts out of sight the peculiarities of the notion as the product of thought only, inevitably compels a distinction between what we may call the real processes of thinking whereby notions are formed and the elaborative processes by which notions when formed may be treated, and, by regarding notions as simplest data, leads back to the old nominalist doctrine according to which all thinking is but the compounding and separating of simple elements.[3]

[1] See specially the treatment of judgment by Esser (*Logik*, §§ 56 and 61), and Jakob (*Log. u. Met.*, §§ 189, 194, 201, 202), where the division of judgments into categorical, hypothetical, and disjunctive flows from a quite arbitrary and artificial principle.

[2] See Twesten, *Logik*, §§ 51-57, and 61; Hamilton, *Logic*, i. 230 *sq.* It may here be remarked that Hamilton's mode of translating the relative sections of Krug and Esser, his main authorities for the details of the Kantian logic, clearly shows that he did not attach any special significance to the phrase "unity of consciousness." In his view, the unity implied in the judgment A is B was the union of A and B in the notion of a given totality or whole—A being part of B in one aspect, B being part of A in another. This relation of whole and part is quite un-Kantian.

[3] It is by this course that the curious phenomenon of an algebraic

And, in the second place, there is involved in all this the underlying prejudice, which it was the very business of the critical system to destroy, the attempt to treat knowledge, and thought, which is an integral part of knowledge, in a purely mechanical fashion. The Kantian analysis for the first time in the history of philosophy brought into clear light the essential peculiarity of knowledge, the reference of all the manifold details of experience to the unity of the thinking subject. Such reference, and the modes in which it expresses itself, are not to be conceived mechanically, nor can we regard the products of thought, the notion, judgment, and reasoning, in the same fashion in which, with but partial success, we treat, in psychology, the representations or reproductions in idea of actual fact. The essence of thought, the unity in difference of objects known and subject cognising, is that which constitutes in its several modes the peculiarity of notions, judgments, and reasonings. The notion is simply the work of thought, looked at, if the expression be allowed, statically. There is no single psychical product, to be treated by the method of observation which is applied in psychology to sensations and ideas, which can be called the notion. Mental facts, which rightly or wrongly psychology deals with after its mechanical fashion, present themselves in a new aspect when they are regarded as parts, or rather as organic elements, in cognition. If we endeavour to apply the abstracting, isolating method of observation *ab extra* to them, doubtless only mechanical, abstract, and external

or symbolic logic springing from the Kantian groundwork has come about. The same result follows, indeed, from any view of thought as merely exercised *about* facts which are already in themselves completed cognitions. Whether we call these notions (with Hamilton) or πρῶτα (with Antisthenes) or elementary data (with Leibniz) or simple apprehensions (with the nominalists), the result is the same.

relations will manifest themselves as obtaining among them, and there may thus be deduced a mass of abstract formulæ expressing relations of agreement and disagreement, total or partial coincidence, confliction, intersection, or coexistence and sequence, which have abstract truth, but are in no way adequate to express the genuine nature of thought.

Kant himself proceeds, as was said, by simply assuming, as somehow given, the cardinal forms of unity in consciousness, and, distinguishing form of judgment from matter by the apparently simple difference between matters united and forms of uniting, draws out the types of judgment under the familiar rubrics of quality, quantity, relation, and modality. The same assumption of distinctions only to be given by the higher researches of transcendental logic is manifested in his treatment of reasoning, the deduction of one judgment from others. Three main types of such deduction are signalised: (1) deductions of the understanding, in which the conclusion follows simply from change in the form of the given judgment; (2) deductions of reason, in which the necessity of the deduced proposition is shown by reference to a general rule under which it falls; (3) deductions of judgment, in which the conclusion is reached by the treatment of given experience in reference to a general rule of reflection upon experience. Under the first of these fall the familiar forms of immediate inference; under the second, syllogism in its three varieties, categorical, hypothetical, and disjunctive; under the third, inductive and analogical reasoning.[1]

[1] There is much interesting matter in the details of the brief sections in which reasoning is handled, as, *e.g.*, the treatment of the syllogistic figures and of the fourth figure in particular, the parallel between induction and analogy, and the reference of both to the abstract formula of the fundamental assumption regarding intelligibility of nature; and it is important to note that Kant lends no counte-

The understanding, if one may interpret Kant freely, is the process by which the worth of what is given is fixed and determined; it moves not beyond the given fact, and can therefore subject the fact to no other than formal transformation. The determining judgment or reason is the expression of the fundamental fact in knowledge that all experience is subject to general rules or conditions; there must therefore be a determination of the particular by the general; there must be ground for subsuming the particular and the universal. The forms of such subsumption and determination of the particular by the general are syllogisms. Syllogism therefore is the mode in which the essence of cognition is made explicit. The reflective judgment is the expression of the tendency to treat the contingent details of this or that given experience after the analogy of the general rule that all experience is subject to intellectual determinations. This analogy does not necessitate the specific determination of the particular by any specific universal, but serves as general directrix in experiential researches. It is sufficiently evident that a remodelling of the older logical doctrine such as this rests upon a wider and more comprehensive philosophical view of knowledge as a whole, that such distinctions cannot flow from either of the principles previously indicated as those on which the formal conception of logic rested, and, finally, that the logical aspect of these distinctions is formal in the only true sense of that

nance to the opposition of syllogism and induction as respectively reasoning from whole to parts and from parts to whole. But the special peculiarities of his logical method are throughout those of the *Kritik*, to which reference is implicit in all that is said, and the results sufficiently show the total impossibility of successfully dealing with reasoning from the so-called independent point of view of formal logic.

word—viz., in that the treatment is of necessity general, applicable to all or any thinking.

31. As in the Kantian system there were placed, side by side, two diverse conceptions of logical system, that of transcendental logic, and that of formal logic, without any adequate link of connection between them, so from the Kantian position there diverged two quite distinct schools of logic, the transcendental or metaphysical, and the formal. As regards the second of these, but little requires to be said. The great body of logical treatises written from the Kantian formal point of view contain nothing of interest. In them the traditional logic is handled under the rubrics supplied by the Kantian general philosophy, with more or less of purifications from needless detail, according to the acuteness or insight of the writers, with more or less of deviation from the Kantian lines. In but few cases did the real difficulty, that of assigning to formal logic an independent plan and method, lead to a radically fresh treatment.[1]

The Kantian transcendental logic, being an analysis of the conditions under which objectivity in general becomes possible material for cognition, is in a special sense a new

[1] Generally, the formal logician is compelled simply to take the processes of thought as determined in psychology or metaphysics or what not, and to consider certain aspects of them. His science has, therefore, no independent place, and no method of development. Independence may be striven after, either by attempting to develop all processes of thought and their logical peculiarities from an initial definition of thought solely, or by combining with this definition the view that non-contradictoriness is the one logical quality, and thus assigning to logic the discussion of the conditions of non-contradiction in thought. Of the first, Hamilton may be taken as the type; of the second, Twesten, Mansel, and Spalding.

theory of thought. For thought is the process mediating the unity of the ego and the multifarious detail of actual experience; and only through thought, the universal, are objects so determined that they are possible matters of knowledge for a conscious subject. As determinations of objects, the pure elements of thought may be called notions, while the realisation of notions in conscious experience is the judgment, wherein the universal of thought and the particular of sense are synthetically united, and the systemisation of experience is the syllogism. Notion, judgment, and syllogism are thus, in the transcendental logic, no bare, abstract forms, but have as their content the pure determinations of objectivity in general. They cannot be conceived mechanically, as mere products differing only in degree of generality and abstractness from the ideas and connections of association which appear as due merely to the psychological mechanism of the human consciousness. They are the essential forms of the ultimate synthesis through which knowledge becomes possible, and thus express in their organic system the very nature of thought, *i.e.*, of the thinking subject.

In the Kantian doctrine, however, as it developed itself historically, there are various points of view which disturb the harmony of the system as thus sketched. Two in particular require special notice, as from these the later attempts at a complete revision of logical theory have taken their origin. (1) Throughout the Kantian work there appears a constant tendency to regard the ego, or central unity of self-consciousness, as merely abstract, as related mechanically, not organically, to the complex of experience in which its inner nature is unfolded. This tendency finds expression in various ways. Thus the synthesis, which has been shown to be the essential feature of cognition, is

regarded as on its subjective side a union of intellectual function and receptivity of sense, and the contributions from either side are viewed as somehow complete in themselves. Knowledge, in accordance with this, might be considered to be the mechanical result of the combination or coherence of the two, a combination which in the last resort must appear to the conscious subject as contingent or accidental. (2) Knowledge, the systematic union of universal and particular in experience, is thought as containing in some obscure fashion a reference to the most real world, the realm of things in themselves, and therefore as being, in antithesis thereto, strictly subjective. The processes of thought, by which unity is given to experience, thus manifest themselves as limited in scope, and as being the very ground or reason of the restriction of knowledge to phenomenal in opposition to noumenal reality.[1]

The presence of these two difficulties or perplexities in the Kantian system, which are, indeed, at bottom but one, led to revision of transcendental logic in two directions. The one line proceeded from the analysis of knowledge as the product of intellectual function and receptivity, and, uniting therewith metaphysical conceptions of varied kinds, culminated in a doctrine of cognition which, retaining the distinction between real and ideal as ultimate, endeavoured to show that the forms of the ideal, *i.e.*, of thought, and the forms of reality were parallel. Logic, under this new conception, appeared as a comprehensive theory of knowledge, the systematic treatment

[1] It is unnecessary to consider what exactly was Kant's teaching on either of these points, or what the significance of the relative doctrine may be in his system. It is sufficient, for the historical purpose in hand, to indicate the apparent tendency of his work, for from this the later developments take their rise.

of the modes in which thought, conditioned by its own nature and by the nature of the reality upon which it is exercised, develops into knowledge, *i.e.*, of the modes in which a representation of things characterised by universality and evidential force is obtained. On the whole this is the position assigned to logic by Schleiermacher, whose view is followed in essentials, though with many variations in detail, by a large and important school of logical writers.[1]

The second direction may be characterised generally as the attempt to develop fully what is involved in Kant's conception of thought as the essential factor of cognition. Any opposition between metaphysic as dealing with the real and logic as dealing with the ideal element in knowledge appears, in this view, as a mere effort of false abstraction. The very nature of reality is its nature in and for thought. The system of pure determinations of objectivity, which Kant had imperfectly sketched, is not to be regarded as a piece of subjective machinery, because it expresses the inmost conditions of intelligence as such. Nothing is more real than the ego, than intelligence or thought. Transcendental logic, or logic which is at the same time metaphysic, is the only discipline to which the title logic by right belongs. For it contains the complete system of the forms in and through which intelligence is realised. The notion, judgment, and syllogism are doubtless forms of thought, but they have their definite content. They are the modes in which the forms of objectivity are realised for intelligence, and are thus at once abstract and concrete. The so-called formal logic

[1] See, for an enumeration of the more prominent members, Ueberweg's *Logik*, § 34, a work which itself is an admirable exposition from the same point of view.

is a mere *caput mortuum*, a descriptive study of some few types of the application of thought to matters of experience. On the whole this is the view of logic developed through Fichte (and in part Schelling) by Hegel, and the Hegelian system shall here be regarded as its complete and only representative.

VIII

LOGIC AS THEORY OF KNOWLEDGE

32. The position assigned to logic as theory of knowledge and the range of problems included in it are determined by the general philosophic view of the distinction between the reality to be apprehended by thought and the subjective nature of thought itself. There may be, therefore, numberless variations in the mode of treating logic with general adherence to the one point of view.[1]

In the *Dialektik* of Schleiermacher, for example, the fundamental characteristic is the attempt to unite some portions of the Kantian analysis of cognition with Spinozistic metaphysic. Knowledge is regarded as the complex combination of intellect, the formative, unifying, idealising faculty, and organisation or receptivity of sense. The generality or common validity of cognition rests on the uniform nature of organisation and on the identity of all ideas in the one ideal system. The objective worth of cognition is referred on the one hand to the determined

[1] It appears an historic error to identify the point of view here referred to with the Aristotelian. The notion of a parallelism between the forms of reality and the forms of knowledge is too definite to be covered by the mere expression, whether in Aristotle or in Plato, of the doctrine that knowledge is knowledge of being.

connection between the real universe and the organisation through which the individual is part of the real order of things, on the other hand to the ultimate metaphysical parallelism between the system of ideas and reality. The primary forms of knowledge, notion, and judgment, distinct from one another only as being knowledge viewed now as stable now as in process, correspond to the ultimate elements of the real, the permanent force or substance and its variable manifestations. Syllogism and induction, with the subordinate processes of definition and division, analysis and synthesis, are technical modes of the development of notions and judgments, modes by which inchoate notions are rendered definite, by which incomplete judgments are rendered complete.[1]

That there is much valuable and suggestive material in this mode of regarding logic is undoubted, and in the discussion of isolated forms of knowledge, such as judgment, it is always desirable that there should be kept in mind the reference to the ultimate character of objectivity. But the whole point of view seems imperfect and open to such objections as will always present themselves when a principle is not carried out to its full extent. It may, for propædeutic purposes, be desirable to separate the handling of logical forms from metaphysic, but such separation cannot be ultimate. The system of forms of reality to

[1] Perhaps the most complete treatment of logic from this point of view is that of George, *Logik als Wissenschaftslehre*, 1868. Ueberweg, dissenting from Schleiermacher's view of syllogism and the systematic processes of reasoning, lays out more fully what in his view are the aspects of reality corresponding to the typical forms of knowledge. Trendelenburg endeavours to fill up the gap between real and ideal by emphasising the community of character between motion, as the ultimate reality, and constructiveness in knowledge, the central activity of the ideal.

which the forms of knowledge are assumed to correspond must in some way enter into knowledge, and they cannot enter in as an absolutely foreign ingredient, to which knowledge has simply to conform itself. For, if so, these metaphysical categories would be discoverable only by an analysis of concrete knowledge, and they would remain as inferences from the nature of cognition, not as data directly known. The cardinal difficulty which appears in all treatments of logic from this point of view is that of explaining how there comes to be known an objective system of things with characteristic forms or aspects, and it is not hard to see that the acceptance of a reality so formed is but a relic of the pernicious abstraction which gave rise to the Kantian severance of knowledge from noumenal reality.[1] In short, the position taken by Schleiermacher and his school, as final standing ground, is but an intermediate stage in the development of that which lay implicit in the critical philosophy.

Moreover, it is hardly possible to assume this point of view without tending to fall back into that mechanical view of knowledge from which Kant had endeavoured to free philosophy. If there be assumed the severance between real and ideal, it is hardly possible to avoid deduction of all that is characteristic of the ideal order

[1] Thus we find in Schleiermacher (*Dial.*, §§ 132-34) that the ultimate difference of ideal and real is accepted as simple datum. In Ueberweg (*Logik*, § 8 and *passim*) there is continuous reference to an inner order of things, the forms of which are the metaphysical categories; but the actual treatment is altogether independent of these forms; and we may conjecture that, in the last resort, Ueberweg would have explained the characteristics of logical thinking by reference rather to the psychological mechanism than to a supposed nature of things (see *Logik*, §§ 40-42), and thus approximated to the position of Beneke rather than to that of Schleiermacher.

from the observed or conjectured psychological peculiarities of inner experience. The real appears only as ultimate point of reference, but in no other way determines the form of knowledge. The characteristic relations which give content to notions, judgments, and syllogisms are deduced psychologically.[1] In the long run, it would no doubt be found that the real key to the position is the belief, more or less expressed, that the systematic view of thought as comprehending and evolving the forms of reality is an unattainable ideal—that metaphysic, to put it briefly, is impossible.

To some extent this is the position taken by Lotze, whose cautious and ever thoughtful expositions are invariably directed to the elucidation of the real *nodi*, the real roots of perplexity or incompleteness of doctrine. In his view logical forms are the modes in which thought works up the material, supplied in inner experience by the psychological mechanism of the soul, in conformity to the ultimate presuppositions with the aid of which alone can harmony, or ethical and æsthetic completeness, be gained for our conceptions of things. But with this doctrine, which approaches more clearly than any other of the type to the metaphysical logic, there is coupled the reserve that any actual point of view from which the development of these presuppositions, their rational explanation, might become possible is unattainable. Our confidence in them

[1] This tendency, which appears in Schleiermacher and Ueberweg, and indeed in all the logics of that school (George's *Logik*, *e.g.*, is hardly to be distinguished from psychology), is prominent in Beneke. It is curious to note a precisely similar result in the logical theory of Herbert Spencer. Spencer supposes himself to be throughout referring to the nature of reality, but in fact all that is specific in the forms of reasoning developed by him is of psychological origin (see *Pr. of Psych.*, ii. §§ 302-9).

is finally of an ethical character, and depends upon our conviction of the ethical end or purpose of all the surroundings within which human life and character is manifested. In logic as in metaphysic we must content ourselves with more or less fragmentary treatment.[1]

[1] Lotze's whole view of the genetic connection of the forms of thought is peculiar to himself, and deserves separate treatment (see below, p. 194 *sq.*).

IX

LOGIC AS METAPHYSICAL

33. The peculiarities of this, the final conception of logic, are not to be deduced from the simple statement that in it no distinction is drawn between logic and metaphysic.[1] There must be understood the ultimate view of knowledge as that in which thought and reality are united, and of philosophy generally as the attempt to develop the whole system of these abstract determinations of thought by which coherence and intelligibility are given to knowledge. In it there is carried out to the full extent Kant's idea of thought as the ultimate germ of intelligibility.

In the critical system, as we have seen, the fundamental idea was continuously disturbed by the intrusion of doctrines which possessed significance only when the problems were treated from a quite opposed point of view. Thus the abstract separation of conscious experience, regulated according to the conditions of the unity of thought, from a supposed realm of reality involved the consideration of the subject as one portion or item of a mechanical whole. In other words, the Kantian system proved itself unable to unite in a comprehensive fashion

[1] For there is no such definite understanding as to what these mean as would make the statement of their identification helpful.

the two ideas of thought as the universal in experience and of thought as the activity or mode of realisation of the individual subject. The central point of view, that which refers all in experience to the unity of thought, was continuously departed from, and as a natural consequence the various forms or modes of thought were treated, not in relation to their ultimate unity, but as isolated facts, to be dealt with by principles resting on a totally opposed doctrine. It is the essence of the Hegelian method to keep continuously in view the concrete unity and totality of thought, to treat each special aspect or determination as an integral portion of an organic whole, a portion which must prove itself unintelligible and contradictory if regarded apart from its relations to the whole, and so to avoid those mechanical separations and abstractions which had proved fatal to the Kantian doctrine.

In the development of a method which rests upon and endeavours to retain so comprehensive a point of view, there must of necessity be much that is tentative and imperfect. Differences of opinion regarding the main stages in the development, regarding the particular content of any one stage, are quite compatible with adhesion to the general principle of the whole.[1] But from this point of view only can justice be done to those forms of thought which have always been regarded as the special material of logical treatment; from any other, the treatment must be partial, fragmentary, and, so to speak, external. Thus, notion, judgment, and syllogism are not, in this view,

[1] Hegel himself fully recognises the tentative character of the numerous divisions and classification of the categories of thought which make up the substance of the *Logik*, and desires that too much stress be not laid on the formal side of his exposition (see *Logik*, i. 29).

treated as merely subjective modes in which the individual consciousness apprehends and works up the material of experience, but as higher, more developed, and therefore richer forms of the determinations of thought in and through which intelligibility of experience is acquired. The whole system of these determinations of thought, the categories, is the matter of logic ; the realisation of them in subjective experience, or the treatment of the successive phases of consciousness in which abstract thought comes to be recognised in and by the individual, is the matter of the philosophy of spirit, of which psychology is one portion. Doubtless the logical treatment may be led up to by tracing the modes in which the full consciousness of the determinations of thought as the essence of reality is attained, but such introduction is propædeutic merely ; and within the logical system itself the starting-point must be the simplest, least definite of those categories whereby for spirit the realm of fact becomes intelligible.

The nature of the opposition between this view and that of the ordinary logic, which in the main rests upon the principle of individualist psychology, that the content of knowledge is derived *ab extra*, from an entirely foreign world of fact, will become more clear if there be considered specially the treatment which under the two methods is given to the notion. Notions, in ordinary logic, are regarded as products formed from the data supplied by presentative and representative experience, and the mode of formation as generally conceived is a continuous process of critical comparison, recognition of differences, similarities, and grouping of like facts. Not only then does the notion present itself as relatively poor and meagre in content, a kind of attenuated individual, not only are the only

characteristics presented to the operation of thought mechanical and external, but the final product appears as a mere subjective abbreviation of what is given in experience.

In the process, however, even as it is ordinarily conceived, there is more involved than is apparent on the surface. The individuals subjected to the abstracting and generalising activity of thought are *qualified* individuals, *i.e.*, individuals viewed as determined in their own nature and in respect of thought by a whole network of relations, which when stated abstractly are really of the nature of categories. They are individuals only for a unifying intelligence which views them under diverse aspects, and these aspects are the blank forms of intelligibility, which it is the very function of logic to consider in system. Moreover, the purely formal acceptation of the notion as a mere mental hieroglyphic or sign stands in sharp contradiction to the view which as a rule accompanies it, and which, for the most part, receives explicit statement in a so-called applied logic or doctrine of method, that in the notion is contained the representation of the essence or truth of reality. It is impossible to retain with any consistency the merely arithmetical or numerical doctrine of the notion, as containing fewer marks than the individual, of the genus as characterised by a less number of attributes than the species, and so on. Underlying all genuine knowledge, all classification, and therefore all formation of notions, is the tendency towards the subordination of parts to a law which determines them. The generic attributes are not simply the points of agreement, but the determining characteristics, and the notion of a thing is the explicit recognition of its nature as a particular manifestation of a universal law.

Thus, even within the limits of the ordinary logic, there are problems which force upon it the reconsideration of the view which regards the notion as merely a mechanically formed psychical fact. Knowledge, no doubt, is only realised subjectively in and through psychical facts; but the treatment of it in its nature as knowledge, and the treatment of its psychical aspect, are *toto genere* distinct. The metaphysical doctrine which keeps consistently in view thought as the essence of knowledge in its own nature has therefore to contemplate the notion in strictest relation to thought, as one mode in which objectivity as such is apprehended, made intelligible, and, in a very special sense, as the mode in which the nature of thought is made explicit. Thus the notion can only appear as uniting and comprehending under a new aspect those intellectual determinations whereby things are related to one another in a cognisable system.

The special characteristic of the Hegelian logic, the methodical principle of development of the determinations of thought, requires for its full elucidation a longer treatment than is compatible with the scope of a general sketch. But it seems necessary to add a word respecting certain difficulties or objections which apply, not specially to the methodical principle of Hegel's logic, but generally to the idea of a logic which is at the same time metaphysic or a treatment of ultimate notions. These objections may be variously put, according to the special point of view assumed by the critic, but they are in the long run dependent on one mode of interpretation of the fundamental antithesis between being, or reality, and thought. For, whether we say that it is confusion to identify thought-forms with relations of fact, that it is unphilosophical to assume that being of necessity conforms to thought, that thought

is purely subjective and knowledge the system of forms in and through which the subjective is brought after its own nature to an adequate representation of objective fact, or point to phenomena of perception as showing that even adequate correspondence, not to speak of identity, between subjective and objective must be matter of discussion, or lay stress upon the procedure of science as negativing the preliminary assumption of the logico-metaphysical assumption, we but express in varied ways a fundamental interpretation of the opposition between reality and knowledge. We assume an initial distinction, the grounds and precise nature of which are never made clear. For the antithesis between thought and reality is an antithesis in and by means of conscious experience, and is not to be comprehended save through conscious experience. If, indeed, we start with conscious experience as a mechanically formed *tertium quid*, something which arises out of the correlation of an unknown subject and an unknown object, we may certainly retain, as an ever-recurring and insoluble problem, the possibility of cognising either factor *per se*.

But the problem arises not from the antithesis but from our way of reading or interpreting it. Opposition between subjective thinking and the real world of fact, slow, tentative, and imperfect development in individual consciousness of knowledge which contains in essential relation the opposed elements, distinction therefore of the metaphysical or real categories which determine the nature of objects as knowable from the ideal or logical categories which express more specifically the fashion in which the knowable object is reduced to the subjective form of cognition, are not only perfectly compatible with, but are strictly reasoned conclusions from, the ultimate doctrine that in thought alone

is to be found the secret both of knowing and of being. To bring against this doctrine the continuous complaint that it assumes an identity which, if it can be proved at all, at least demands proof, is to misunderstand the very notion of identity which plays so important a part in the objection. Not even in the most judicious and thoughtful critics of metaphysical logic, in Lotze for example,[1] does one find a sufficiently careful distinction between a mere question of nomenclature (*i.e.*, whether we shall restrict the title *logic* to the portion of general system which deals with notions, judgments, and syllogism, while reserving for metaphysics all the other inquiries) and the question of theoretical importance, whether there remains, over and above the difference between the more immediate determinations of thought and its more complex or reflective modes, an essential difference in knowledge between thought and reality. In less careful critics the oversight simply leads to the contention that we shall always repeat the problem of knowing and being as insoluble, and shall view knowledge as a mechanical, subjective product.

Many of these objections doubtless result from a very simple fact, already more than once alluded to. Particular distinctions, apparently the most elementary, frequently involve and are unintelligible apart from a developed, though not necessarily consistent or well-grounded, conception of things in general. Thus the emphasis laid upon thought as essentially subjective, as being merely the system of operations whereby the individual brings into order and coherence in his own experience what is furnished *ab extra* through the natural connection in which he is placed to the objective world,

[1] See his *Logik* (1843), pp. 10, 11, and *Logik* (1874), bk. iii., chaps. 4, 5.

seems at first sight the most simple and direct consequence of the actually given distinction between the individual as one natural unit and the sum of things comprehending him and all others. But, on analysing more closely the title for applying to philosophical problems a view which is that of practical life, and doubtless legitimate and necessary within that sphere, we readily become aware of a whole series of speculative assumptions implicit in that view, and possibly without any adequate justification. At all events, whether or not the view be ultimately defensible, and in the same form in which it is at first assumed, it is unphilosophical to start in the treatment of a difficult and important discussion from principles so ambiguous and undetermined. The practical difference between the individual agent and the external sphere within which his individual operations are realised and which is therefore treated by him, from his point of view, as external, throws no light *per se* on the nature of the ultimate relation between the individual thinker as such and the world within which his thought is exercised. The confusion between ultimate distinctions and practical points of view is productive of most pernicious consequences not only in logic specially but in philosophy at large.

X

CRITICISM OF THE CHIEF LOGICAL SCHOOLS

34. It will probably be now apparent that determination of the nature, province, and method of logic is, and has always been, dependent on the conception formed as to the nature of knowledge. Discussions regarding the precise definition of logic are not mere analytical disputes regarding the best mode of expressing in terms the nature of a subject sufficiently agreed upon; variations in the treatment of particular portions of logical discipline do not arise from more or less accurate discrimination of the nature and relations of given material; nor are differences in respect to the amount of logical matter to be considered mere expressions of difference as to the range of the same fundamental principles. The grounds for divergence are much more deeply seated; and, looking back upon the historical survey of the main conceptions of logical science, it seems quite impossible to hope that by comparison and selection certain common points of view or methods may be extracted, to which the title of logical might beyond dispute be applied. It results, moreover, from this fact that criticism of various logical views cannot be conducted by the method of bringing each in turn before a recognised rule or established opinion respecting the contents and methods of logical science.

The logic, as one may call it, of each philosophical theory of knowledge is an integral part or necessary consequence of such theory; and its validity, whether in whole or in part, depends upon the completeness and coherence of the explanation of knowledge in general which forms the essence of that theory.

The course of the preceding historical survey has brought before us a variety of conceptions of logic resting on various doctrines of knowledge; and, had it been possible to include in these historic notes references to the several treatments of details—such as classification of notions, analysis of judgments, system of reasoning, and methods of proof—an equal variety in special points would have been apparent. Any criticism of a general conception of logic or special application thereof, which does not rest upon criticism of the theory of knowledge implied in it, must be inept and useless.

It is not possible to include such expanded criticism in the present work. There remains therefore only one aspect of these various logical schemes which may be subjected to special and isolated examination, viz., the inner coherence of each scheme as presented by its author. Naturally such an examination can be applied only to views which imply the separate existence of logic as a body of doctrine developing into system from its own peculiar principles. When it is a fundamental position that logic as such has no separate existence, but is one with the all-comprehensive doctrine or theory of the ultimate nature of cognition, it is not possible to criticise such conception of logic separately; criticism of logic then becomes criticism of the whole philosophical system. In most of the views brought before us, however, a special place has been assigned to logic; it has been placed in various relations

to the allied subjects of psychology and metaphysics, but with a certain independence; and its contents have been assumed to follow in some way from its own special principles. It is therefore possible to apply internal criticism to the more important of these general views, and to consider how far the pretensions of logic to an independent position and method are substantiated.

From the foregoing remarks it will also have become apparent that a general classification of logical schools, as opposed to the reference of these to ultimate distinctions of philosophical theory, is impossible. A distribution into formal (subjective), real (empirical, or, as German authorities designate it, *erkenntnisstheoretisch*), and metaphysical conceptions of logic is rather confusing than helpful. For the formal logics of the Kantian writers, of Hamilton, and of Mansel are distinct, not only from one another, but from such equally formal logics as those of Hobbes, Condillac, Leibniz, Herbart, Ulrici, Boole, De Morgan, and Jevons. Logic as theory of knowledge presents quite special features when handled by Mill, or by Schleiermacher, Ueberweg, Beneke, and Wundt. And it cannot even be admitted that the threefold classification affords room, without violence, for the Aristotelian logical researches. There are no points of agreement and difference so unambiguous that by their aid a division can be effected.[1]

35. Few conceptions of logic contain, with so little real ground, such professions of completeness and independence

[1] Nor are more detailed classifications, such as those of Rosenkranz (*Die Modificationen der Logik*, 1842), Prantl (*Die Bedeutung der Logik*, 1849), Rabus (*Neueste Bestrebungen*, 1880), of service, except when historical.

as that developed in the writings of the Kantian school.[1] According to this view, logic is a pure science, having as its special material the form of thought, demonstrative in character and with theorems capable of complete deduction from the elementary principles contained in the very notion of form as opposed to matter of thought. But, when one comes to the examination of the system itself, one finds (*a*) that the notions of form and matter are much too stubborn to lend themselves readily to analysis, and that explanations of what exactly constitutes form fluctuate between a merely negative definition (whatever is not treated in any other science, philosophical or otherwise) and a psychological deduction from the assumed nature of thought;[2] (*b*) that the really important factor in determining the contents of logical science is psychology, from which much more is borrowed than the mere preliminary definition of thought; (*c*) that demonstrative character rests entirely on an abstract interpretation of the laws of identity and non-contradiction; (*d*) that throughout the whole system there is not a trace of development, but merely the reiterated application of the law of identity and contradiction, or of some confused distinction between form and matter, to logical products—the notion, judgment, and syllogism—whose nature, characteristics, and distribution are arbitrarily accepted from psychology or general criticism or what not.

Thus, in the majority of cases, logicians who simply followed the lines indicated by Kant introduced into their

[1] Under this head Kant himself, for reasons above given, is not included; the writers referred to are named in Ueberweg (*Logik*, § 34).

[2] Mill's criticism on Hamilton's confused statements regarding forms (*Exam. of Hamilton*, 438-454), is perfectly applicable to the generality of the Kantian treatises on logic.

system, without any criticism, the fundamental distinctions contained in the *Kritik der reinen Vernunft*. The fourfold scheme of quantity, quality, relation, and modality was applied without hesitation, though in varied and always artificial fashion, to notions;[1] judgments were accepted as being categorical, hypothetical, and disjunctive in kind, though the differences are altogether foreign to the logical principles applied; and generally no attempt was made to do more than treat, in an abstract fashion, some aspects of a procedure of thought determined in all its phases by extra-logical considerations. The inevitable result of such a treatment was the undue preponderance given to the doctrine of notions, which, being viewed after the fashion of Kant as given, completed products, appeared as the ultimate units of thought, to be combined, separated, and grouped together in all the higher processes.

The peculiarities of the logical system which is commonly associated with the name of Sir W. Hamilton spring entirely from this view of notions. For, if notions be regarded as the elements of thought, then the judgment which elaborates them can only present itself as the explicit statement of immediate relations discernible among notions. These immediate relations reduce themselves, for Hamilton, to one—the quantitative relation of whole and part—and, attention being concentrated on the extensive reference of concepts, the eightfold scheme of propositional forms is the natural consequence. To such a scheme the objections are manifold. It is neither coherent in itself, nor expressive of the nature of thinking, nor deduced truly from the general principle of the Hamiltonian logic. For it ought to have been kept in mind that extension is but an aspect of the notion, not a separable fact upon which the logical

[1] See, *e.g.*, Krug, *Logik*, § 25 *sq.*

processes of elaboration are to be directed. It is, moreover, sufficiently clear that the relation of whole and part is far from exhausting or even adequately representing the relations in which things become for intelligence matters of cognition; and it is further evident that the procedure by which types of judgment are distinguished according to the total or partial reference to extension contained in them assumes a stage and amount of knowledge which is really the completed result of cognition, not that with which it starts or by which it proceeds.[1]

The utility of basing logical theorems on psychological premisses, a method involved in the procedure of most expositions of formal logic, may well be matter of doubt. For psychology, as ordinarily conceived, has certainly close relations with logic, but in aim and in point of view is distinctly opposed or at all events subordinate to it. The psychological investigation of thought, if carried out consistently, must take one of two forms: either that of description, in which thought, like any other mental fact, is regarded *ab extra* as that upon which attention and observation are to be directed,—in which case therefore any relations of thoughts among themselves must be of such an external nature as can be presented in the field of observation; or that of genesis, development, in which the

[1] The extension of a notion has no numerical or quantitative definiteness. To formulate the judgment as expressing definite amounts of extension, therefore, presupposes complete empirical survey of what, by its very essence, remains incomplete. This is specially noteworthy in the case of Hamilton's particular judgments. A judgment such as *only some A is all B* assumes total and perfect knowledge of the whole spheres of A and B. It is in the strictest sense of the word *universal*. Hamilton, it may be added, finds it completely impossible to work out a coherent doctrine of syllogism from the point of view taken in the treatment of the judgment.

subjective processes of mind are viewed as forms of the one great process whereby knowledge is realised in the individual consciousness. Investigations from the first point of view are diametrically opposed to the logical treatment of thought; for in the latter the essential feature, the reference in the subject, with his mental forms, to an objective order within his experience, is entirely wanting. Such investigation is abstract; it proceeds upon and remains within the limits of a distinction drawn in and for conscious experience, a distinction the grounds, significance, and modes of which require to be treated by a larger and more comprehensive method. Investigations from the second point of view are subordinate to logic in the wider sense; for the treatment of the subjective processes therein is illuminated and determined by the general principles regarding the nature and meaning of conscious experience which it is the sole function of logic to bring forward and establish. The psychology which Hamilton generally has in view is that commonly called empirical, and with his conception of it the two sciences, logic and psychology, are really one.

36. A possible exit from the difficulties or assumptions of the current Kantian logic may be sought by following out and consistently applying the hint contained in Kant's distinction of analytic and synthetic thought, analytic and synthetic truth. It may be said that all thinking involves the fundamental laws of identity and non-contradiction; that in these laws only is to be found the characteristic and most general feature of thought; that in them only is the form, or element contributed by mind itself, to be detected. Logic would thus be regarded as the explicit statement of the conditions of non-contradictoriness in thought, as the

evolution of the formal element in thought, and, since in analytic truth only can non-contradictoriness be discovered without material aid, as the theory of analytic thought. Such is the position assigned to logic by Twesten, Mansel, Spalding, and some others; and the consequences to which it inevitably leads are sufficiently interesting to require that some special examination should be given to it.

In the first place, then, it seems evident that the fundamental distinction implied, that between analytic and synthetic thought, is wrongly conceived. That analysis and synthesis are methods of cognition, differing in many important respects, is undoubted; but such difference lies in a sphere altogether alien to that within which the present distinction is to be sought. Analytic thought, as here conceived, is only to be understood when taken in reference to the judgment, and then also in reference to a peculiarity in the Kantian doctrine. Kant, emphasising the principle that judgment is essentially the form in which the particular of experience is determined by the universal element of thought, but identifying this universal with a formed concept (resembling, therefore, a class notion), contemplated a class of judgments in which the predicate was merely an explication of the subject notion. Such judgments, had the matter been more fully considered, would have appeared as far from primary; and Kant has himself, in the most unambiguous language, indicated the correct view that analysis is consequent and dependent on synthesis — that analytic judgments, therefore, are merely special applications of abstracting thought within a sphere already treated, handled, formed by thought. Mansel, too, whose views are generally acute if not profound, has signalised as the primitive unit of cognition the so-called psychological judgment, which is essentially synthetic in

character. The logical judgment, in fact, about which his conception of logic centres, is recognised as a posterior act of reflection, directed upon formed notions, and is not in any way to be regarded as containing what is a common, universal feature of all judgments.

In the second place, even granting what cannot be maintained, that the process of thought is mere explication of the content of previous knowledge, and that the theory of logic has to do with a comparatively small and subordinate portion of cognition, there is in such a principle no means of development. We may take up in succession class-notions, judgments, reasonings, and in relation to each reiterate, as the one axiom of logic, that the constituent elements shall be non-contradictory; but such a treatment is only possible in relation to a material already formed and organised. The utmost possible value being given to such a view, logic, under it, could be but a partial and inchoate doctrine.

Finally, there is involved in the doctrine of analytic thought, and in the consequences to which attention will next be drawn, a peculiar and one-sided conception of identity or of the principle of identity as an element in thought. Historically this conception has played a most important part: it lies at the root of all nominalist logic from Antisthenes downwards, and has found metaphysical expression of the most diverse kinds. *That things are what they are* is the odd fashion in which a wellnigh forgotten English writer states what is taken to be the universal foundation of all thought and knowledge.[1] The

[1] John Sergeant. See *The Method to Science*, by J. S., 8vo., Lond., 1696, pp. 144, 145. This curious book contains much interesting matter. Sergeant regards inference as "the establishment of identity between extremes by identity with the middle" (p. 227);

representatives of things in our subjective experience, the units of knowledge, may be called notions, and, accordingly, that each notion should be what it is appears as the corresponding logical axiom. The whole process of thought is therefore regarded as merely the explicit statement of what each notion is, and the separation of it by direct or indirect methods from all that it is not. The judgment, essentially the active movement of thought, is reduced to the mere expression of the identity of a notion, and in truth, were the doctrine consistently carried out, Antisthenes's conclusion that the judgment is a fallacious and inept form of thought would be the necessary result. When such a conclusion is not drawn, its place is generally taken by much vague declamation regarding the limited, imperfect, and uncertain character of our knowledge, which is regarded as asymptotically approaching to the adequate determination of truth.

The conception which underlies this view is the abstract separation of thought from things which has been already noted, but the proximate principle is a deduction there-

rejects the second and third figures, and indeed figure at all (p. 233); reduces all modes of inference, hypothetical and others, to one type (p. 247); considers that all truths are identical propositions (p. 267), even the causal relation being of the nature of an identity (pp. 144-5); and concludes with that which is an inevitable consequence of this doctrine, viz., that knowledge of one fact in nature implies knowledge of all nature (p. 269). Much modern criticism of plurality of causes is anticipated here, as indeed it rests on the same abstract conception of identity. If the whole universe be the cause at any one moment, it is perfectly clear that "plurality of causes" is a contradiction in terms; but so, for that matter, would *cause* be under a like condition. The universe is the universe; things are what they are; our thinking is ultimately an incessant reiteration of the same, A, A, A. Sergeant is acute enough to see what many modern critics have not perceived, that the notion of change is endangered by such an abstract principle (see pp. 305-6).

from. Knowledge or thought is treated externally as a series of isolated units or parts, and the results of cognition —notions, judgments, and reasonings—are viewed as the constituent factors. Thus, *e.g.*, when it is said that a judgment is the expression of an identity, there are possible only two modes of explanation: the one, that the identity referred to is that between the original notion (subject) as unqualified by its predicates and the same as qualified, in which case manifestly the result of the judgment is taken as being its constituent essence; the other that the identity is that of the applicability of distinct names to the same fact, in which case we accept without further inquiry and exclude from logical consideration the processes of thought by which the application of names is brought about, and assume as being the procedure of thought itself that which is its consequence. Under all circumstances, difference is as important an element as identity in the judgment, and to concentrate attention upon the identity is to take a one-sided and imperfect view.[1]

37. So soon, however, as the real nature of thought has been thrown out of account as not concerned in the processes of logic, so soon as the law of non-contradiction in its manifold statement has been formulated as the one principle of logical or formal thinking, there appears the possibility of evolving an exact system of the conditions of non-contradictoriness. The ultimate units of knowledge, whatsoever we call them, whether notions or ideas of classes or names, have at least one characteristic: they are what they are, and therefore exclude from themselves

[1] On Condillac's attempt to treat judgments as identities (or equations) some excellent remarks will be found in De Tracy, *Idéologie*, iii. 133-143, *cf.* Duhamel, *Des Méthodes*, i. 89-94.

whatever is contradictory of their nature. They are combined positions and negations, that which is posited or negated being left undetermined,—referred, in fact, to matter as opposed to form. With respect to any article of thought, therefore, the only logical requirement is that it shall possess the characteristic of not being self-contradictory, and the only logical question is, what exactly is posited and negated thereby. Complex articles of thought viewed in like manner as complexes of positions and negations may have the same condition demanded of them and the same question put regarding them. A judgment and a syllogism, if narrowly investigated, will appear to be merely complex articles of thought, complexes of positions and negations.

Proceeding from such a conception there may be treatments more or less systematic and fruitful. In the hands of Kantian logicians, such as Twesten, Mansel, Spalding, and the like, little is effected, for, as the forms of thought are accepted as giving and as having their characteristics otherwise fixed (by psychology or critical theory of knowledge), the treatment resolves itself either into repetition, in respect to each, of the fundamental logical condition, or into the erection of a specific kind of thought (analytical) which has no other feature save that of correspondence with the said condition. But it is clear that restriction by any psychological or critical doctrine of thought is an arbitrary limitation. It is needful only to regard the operation of thought as establishment of positions and negations, and to develop, by whatever method, the systematic results of such a view. Hobbes's doctrine of thought as dealing with names and as essentially addition and subtraction of nameable features, Boole's doctrine of thought as the determination of a class, Jevons's view of thought as simple

apprehension of qualities,— any of these will serve as starting-point, for in all of them the fruitful element is the same. The further step that the generalisation of the system of thought must take a symbolic form presents itself as an immediate and natural consequence.

38. By the application of a symbolic method is not to be understood what has been practised by many writers on logic—the illustration of elementary logical relations by numerical or algebraic signs or by diagrammatic schemata. The expression has the signification which it bears in mathematical analysis, and implies that the general relations of dependence among objects of thought, of whatsoever kind, in correspondence with which operations of perfectly general character are carried out, shall be represented by symbols, the laws of which are determined by the nature of these relations or by the laws of the corresponding operations. The mere use of abbreviations for the objects of treatment is not the application of a symbolic method ;[1] but so soon as the general relations of, or general operations with, these objects are represented by symbols, and the laws of such symbols stated as deductions therefrom, there arises the possibility of a symbolic de-

[1] Thus one would not describe Aristotle's use of letters for the terms of his syllogisms, nor the current logical abbreviations of S, P, and M in like case, as being, in any true sense of the word, symbolic. On the subject generally, the instructive work of Mr Venn (*Symbolic Logic*, 1881) should be consulted. Mr Venn has not only in this work expounded the foundations and main theorems of Boole's logic with a care and skill that leave nothing to be desired, but he has, independently of many real contributions to logical analysis, put in its true light the nature of symbolic method in logic. He has rendered it impossible, even for the outsider, to complain that symbolic logic is an arbitrary application of mathematical method to logical material.

velopment or method of treatment, which may lead to more or less expanded results according as the significance of the symbolic laws is more or less general. Thus quantity, whether discrete or continuous, presents, as an aspect of phenomena, relations of a highly general kind, offers itself as object of operations of a highly general kind, and is therefore peculiarly the subject of symbolic treatment.

Currently, indeed, the treatment of quantity is assumed to have the monopoly of symbolism; but such an assumption is not self-evidently true, and it is permissible to inquire whether matters non-quantitative do not present relations of such generality that they, too, can be symbolically dealt with. It is, however, a further question whether the generality of the relations and therefore the significance of the symbols in such cases, although subject to some special conditions not necessarily involved in the nature of quantity, do not spring from the fact that we treat the matters as quantities of a special kind, and so insensibly find ourselves applying quantitative methods. In other words, it remains to be investigated, after the preliminary definitions and axioms of any symbolic method have been laid down, whether the conception of thought with which we start, or a special feature distinctly quantitative in character, has been the truly fruitful element in after-development of the system.[1]

The first step in any symbolic logic must evidently be the determination of the nature and laws of the symbols; and, as these follow from the nature of the operations of thought, the first step is likewise a statement of the essential characteristic of thinking. As above noted, there have been adopted various modes of expressing this character-

[1] An excellent note on symbolic logic will be found in Lotze, *Logik* (2nd ed., 1880), pp. 256-59, Eng. tr., pp. 208-23.

istic, and in some cases the mode adopted is not one from which any generally applicable symbolic rules of procedure could have followed.[1] Two only require here to be noted, as representing special views: first, that which proceeds from the idea of thought as essentially the process of grouping, classing, determining a definite set of objects by a mark or notion; and second, that which proceeds more generally from the conception of thought as consisting of a series of self-identical units, to be variously combined in obedience to the law of self-identity.[2] Adopting the first view, we find that processes capable of symbolic representation, by the customary algebraic signs of addition, subtraction, equivalence, multiplication, and division, have a perfectly general significance in reference to the combination, separation, equalisation of classes, to the imposition and removal of restriction on a class; that to the symbols there can therefore be assigned a set of general laws; and that any peculiarity of these symbolic laws which differentiates them from the laws of like symbols in mathematical analysis is deducible from the notion of thought with which we started, and is consequently to be carried along with them in all the after development.[3]

[1] Some of these, as *e.g.*, Lambert's and Ploucquet's, are noted and discussed by Mr Venn (*Symbolic Logic*, xxxii.-xxxvi. and *passim*).

[2] The first is the view taken by Boole (and expounded with great fulness in Venn, as above); the second is that of the brothers Grassmann (in the *Formenlehre*, 1872, especially bk. ii., *Die Begriffslehre oder Logik*). I do not specially note Jevons's theory, otherwise one of high interest and leading to many elegant and ingenious processes, for it appears to me, while not absolutely coinciding in statement with that of either Boole or Grassmann, to be covered by what is special to each of them, and to be valuable mainly as a simplification in certain particular directions.

[3] Mr Venn, in his exposition of Boole, has done much to clear up the significance and laws of the symbol for division. I am inclined

Symbolic representation of relations of classes follows with equal directness from the general notion that by any such relation a new group is determined in reference to the original groups, or rather that the position or negation of a new group (or series of groups) is given, definitely or indefinitely, as the result of such a relation.

With the aid of the symbolic laws so reached, the logical problem as such may then be approached. Given any number of logical terms (*i.e.*, classes, or, as it may be better put, positions and negations) connected together by any relations, to determine completely any one in reference to the others, or to express any one in terms of the others. The symbolic procedure, expounded with marvellous ingenuity and success by Boole, may take various forms, and may be simplified by many analytical devices, but consists essentially in determining systematically how given positions and negations, definite or indefinite, combine with or neutralise one another. A more detailed account of these formal processes is beyond our limits.[1]

The first question which suggests itself in connection with Boole's symbolic logic is the necessity or advisability of retaining the reference to classes, or the description of thought as classification. Do the symbolic laws really depend to any extent on the logical peculiarities of class

to think that it would be quite in accordance with Boole's idea to assimilate multiplication and division to the familiar logical processes of determination and abstraction (as indeed is hinted by Mr Venn, *l. c.*, p. 80). For these processes can, from the special point of view, relate only to the subdivision of a class in extension, and have no reference to the usual distinctions of connotation and denotation.

[1] Mr Venn's work is here again invaluable. Jevons's *Principles of Science* and *Studies in Deductive Logic* should be consulted. Schröder's *Operationskreis des Logikkalculs* contains some very elegant and simple methods.

arrangement? Mr Venn, who emphasises this feature in Boole's scheme, has, however, done good service in leading up to a different explanation. The general reference to objects, which is also noted as implied in all Boole's formulæ, has nothing to do with the possible difference of conceptualist or materialist doctrines of the proposition; and, in fact, as all distinctions of thing and quality, resemblance and difference, higher and lower, subject and predicate vanish, or are absorbed in the more general principle underlying the symbolic method, phrases such as classification, extension, intension, and the like should be banished as not pertinent. Nay, the usual distinctions of quantity and even of quality either disappear or acquire a new significance when they are brought under the scope of the new principle. "What symbolic logic works upon by preference is a system of dichotomy, of x and not x, y and not y, and so forth."[1] In other words, quantitative differences require to find expression through some combination of the positions and negations of the elements making up the objects dealt with,[2] while the usual qualitative distinctions are merged in the position or negation of various combinations.

The whole phraseology then of classification and its allied processes seems needless when used to denote the simple determination of objects thought. The literal signs express, not "classes," but units, determined in and for thought as self-identical. For this reason then it appears that the view of the foundations of the symbolic methods of logic taken in Grassmann's *Begriffslehre* is more

[1] Venn, as above, p. 162.

[2] Where this is impossible, as in the case of the truly particular or indeterminate judgment, symbolic methods encounter almost insurmountable difficulties.

thoroughgoing, and more closely represents the underlying principles, than that involved in Boole's formulæ and expounded in detail by Mr Venn.[1]

Grassmann, as above stated, deduces logical relations as a particular class of the determinations necessarily attaching to all quantities (*i.e.*, determined contents of thought). Abstraction being made of all peculiarities which may be due to their special constitution, quantities exhibit certain formal relations when they are combined (added, subtracted, &c.). Each quantity is a unity of thought, a definite *positum*, and of such units there are but two classes, elements and complexes. Units of thought, which are self-identical, and therefore subject to the specific law

[1] For this reason we think that Mr Venn's criticism of the intensive reading of logical terms is somewhat beside the mark. Beyond a question, if the point of view from which intension has any significance and importance be adopted, the relations of notions in intension would be impracticable for symbolic handling; but from this point of view no such separation between extension and intension as Mr Venn contemplates is possible. The objects with which symbolic logic can deal, and the relations of which it can take into account, are determined units, in respect to which difference between their qualities as recognised and things possessing them is inept. *A* for symbolic logic, is simply a definite position, with the function of excluding not-A, and the capacity for entering into combination with anything that is not *A*. It might be a class, or an individual, or a group of qualities, or a single quality, and in any case must be dealt with symbolically in connection with others of like kind; *i.e.*, if I call A a quality, I must deal throughout with qualities, and allow no intensive questions as to the results of combination on classes, or groups of things. It is evident also that, under any view of logic, our cognition of things or classes must start with attributes; and the possibility or impossibility of combination, the extent determined by any combination, depend on the relations of possibly combined position or of exclusion between the constituent attributes. Much of Mr Venn's criticism of Jevons's method involves oversight of this fundamental point.

that addition of each to itself or multiplication of it by itself yields as result only the original unit, are notions. The theory of notions, therefore, is the development of the general formal relations of units under the special restrictions imposed by their nature.[1]

There appears very clearly in Grassmann's treatment the essence of the principle on which symbolic logic proceeds. Thought is viewed as simply the process of positing and negating definite contents or units, and the operations of logic become methods for rendering explicit that which is in each case posited or negated. To apply symbolic methods, we require units as definite as those of quantitative science, and the only laws we can employ are those which spring from the nature of units as definite. Now it seems a profound error to reduce the whole complex process of thinking to this reiterated position of self-identical units. Undoubtedly, if we start from any given fact of thought, as, *e.g.*, a judgment, and inquire what can be exhibited as involved in it, we have before us a problem of analysis, the solution of which must take form in a series of positions and negations; but our thinking is not therefore as a whole mere analysis. The synthetic process by which connections of thought among the objects of our conscious experience are established is not the mechanical aggregation of elementary parts. The relations which give intelligible significance to our experience are not simply those of identity and non-identity. It is an altogether abstract and external view of thought, resting in all probability on an obscure metaphysical principle,[2] that would treat it as in essence the composition and decomposition

[1] See *Die Begriffslehre oder Logik* (1872), p. 48. Schröder (*op. cit.*) follows Grassmann, though with the use of *class* phraseology.

[2] As above noted, p. 147 *sq.*

of elementary atoms, of πρῶτα as Antisthenes would have called them. It has, indeed, been imagined that a symbolic logic might be developed which should be independent in all its fundamental axioms of any metaphysical or psychological assumptions; but this is an illusion. No logical method can be developed save from a most definite conception of the essential nature and *modus operandi* of thinking; and any system of symbolic logic finds it necessary, if it is to be complete and consistent, to adopt some such view as that above criticised, to regard thought as purely analytic, as dealing with compounds or units which are themselves highly complex products, only to be formed by a kind of thought not recognised among logical processes.[1]

39. Formal logic, then, in the ordinary acceptation of that term, does not appear to furnish any adequate representation of the real process and method of thought. Any logical theory must of necessity be formal, *i.e.*, abstract or general; for it can consider only the general elements of thought, not specific knowledge in which are involved the finite, limited relations of one fact or class of facts to another. The distinction between logic and the sciences is therefore precisely that between philosophy in general and the sciences. Attempts have been made to include in logical analysis the treatment of scientific method, *i.e.*, to discuss as matter of logic the varied processes by which scientific results have been attained. It is true that logical consideration must extend to the notions through which scientific experience, like any other,

[1] The same fact has been noted in regard to formal logic of the Kantian school, as, *e.g.*, in Mansel's distinction of psychological and logical judgments.

becomes intelligible, and, in so far as scientific method is but the application of the laws of knowledge as a whole, it is a possible, nay necessary, object of logical treatment. But to include scientific methodology in particular, the consideration of the mechanical devices by which we strive to bring experience into conformity with our ideal of cognition, the discussion of methods of experiment and observation, under the one head logic is an error in principle, whether we view logic in its theoretical aspect or in reference to a special propædeutic aim. Generalisations on such topics are wellnigh worthless; they can have vitality and importance only when drawn in closest conjunction with actual scientific work. The theory of scientific method is either doctrine of knowledge treated freely or else the application of thought in connection with actual research and the ascertainment of the principles therein employed. In either case it is not susceptible of abstraction and isolated treatment.

40. There remains only, of the possible views noted, that which identified logic with the theory of knowledge, but which so defined theory of knowledge as to distinguish it from metaphysics. The designation of logic as theory of knowledge is one to which in words there can be no possible objection. It brings into the foreground what it has been the object of this article, by an historico-critical survey, to establish, that so-called logical laws, forms, and problems are hardly capable of statement, certainly incapable of satisfactory treatment, except in the most intimate connection with the principles of a theory of knowledge. To include, however, in the signification of this latter term a peculiar conception of the relation between thinking (knowing) and reality is at once to restrict the scope of

logic and to place an arbitrary and, one would say, an ill-founded restriction on the kind of treatment to which logical problems may be subjected. If it be really the function of logic to trace the forms and laws of knowledge, that function is all-comprehensive, and must embrace in its scope all the fundamental characteristics of experience as known. But no characteristic of experience is more palpable than the distinction, drawn within conscious experience, between knowledge and reality. It is impossible then for a theory of knowledge to start with the assumption that these two exist separately, constituted each after its special fashion, but with a certain parallelism between them. In words one may refer for justification of the assumption to metaphysics, or to psychology, but, in fact, the problem so relegated to some other discipline is essentially a logical question, and the method of its solution exactly that which must be applied in the treatment of subordinate logical questions. Practical convenience alone can lead to any separation of the problems which under this view are referred in part to theory of knowledge and in part to metaphysics. Other and more serious difficulties of the view have been already commented on.[1]

41. In sum, then, the problems and the methods which compose logic in the strictest sense of that term seem to be one with the problems and methods of the critical theory of knowledge. No other title describes so appropriately as that of "logical" the analysis of knowledge as such, its significance and constitution, in opposition to the quasi-historical or genetic account for which the title psychological should be retained. Were such analysis to be described as "transcendental," no objection could be

[1] Above, p. 127 *sq.*

raised other than that bearing on the advisability of using a special term where a more general one is amply sufficient. Were such analysis described as prevailingly "metaphysical," the only answer could be that the term "metaphysical" has had and has many a signification, and that it is well to avoid the use of an ambiguous and question-begging epithet. Abstract speculations about the nature of reality, essences, and what not are as foreign to a genuine metaphysic as to a commonplace logic. The researches to which we would here assign the title "logical" undoubtedly include all that can supply the place of the older metaphysic, but in aim and method are so distinct that the same title cannot be borne by both. To assign so extensive a range to logical investigations enables us to see that the criteria by which at one time or another a narrower province was determined for logic are but partial expressions of the whole truth. The analysis of knowledge as such, the complete theory of the intelligible elements in conscious experience, does hold a special relation to all other subordinate branches of human thinking, whether philosophic in the ordinary sense of that term or scientific. According as one or other aspect of this relation is made prominent, there comes forward one or other of the various modes for settling the province of logic; but these partial conceptions prove their inadequacy when development is attempted from them, and within the systems constructed in accordance with them there is of necessity continuous reference to inquiries lying beyond the prescribed limits.

A certain analysis of some methods of ordinary thinking, based to a very large extent on language, and resembling in many respects grammatical study, has long been current in educational practice as logic; and to those whose con-

ception of the subject has been formed from acquaintance with this imperfect body of rules and formulæ it may appear a violent and unnecessary extension of the term to apply it to the all-comprehensive theory of knowledge. The reasons, however, are imperative; and, as these would lead one to deny the right of this elementary practical discipline to the possession of the title, it is desirable to conclude by offering a single remark on the place and function of this currently designated logic.

Not much trouble is required in order to see that the ordinary school or formal logic can lay no claim to scientific completeness. Its principles are imperfect, dubious, and most variously conceived; it possesses no method by which development from these principles is possible; it has no criterion by which to test the adequacy of its abstract forms as representations of the laws of concrete thinking. Accordingly it is handled, in whole and in detail, in the most distractingly various fashion, and, were it indeed entitled to the honourable designation of logic, the prospects of that science might well be despaired of. But in fact the school logic discharges a function for which exhaustiveness of logical analysis is not a requisite. It has a *raison d'être* in the circumstance that training to abstract methods must needs be a graduated process, and that, whether as a means towards the prosecution of philosophic study in especial, or as instrument of general educational value, practice in dealing with abstract thoughts must have value. Such elementary practice naturally bases itself on the kinds of distinction apparent in the concrete thinking of those to whom it is applied; and for this reason school logic not only connects itself with and is in a sense the development of grammar and grammatical analysis and synthesis, but

may, to a limited extent, include reference to some of the simpler processes of scientific method. In all probability the discord observable among the ordinary treatises on school logic is due to the want of recognition of the true place which can thus be assigned to the subject treated. The doctrine has a propædeutic but not a scientific value.

Note A

HISTORIES OF LOGIC

No complete history of logic, apart from philosophy in general, exists; and there can be no doubt that any such history, as far at least as modern logic is concerned, must be more or less a historical review of the main philosophical systems and of the influence they have respectively exercised on logical study. But of the Aristotelian logic, in its system and in its development throughout the ancient and mediæval epochs, we possess a most adequate history. Prantl's great work (*Geschichte der Logik im Abendlande*, i., 1855; ii., 1861; iii., 1867; iv., 1870), extending to the close of the mediæval period, is a masterpiece of learned industry and skilled exposition.

The following are some of the more important contributions towards a history of logic, whether in independent works or in portions of systematic treatises; most of them, indeed, of small value: Ramus, *Scholæ Dialecticæ*, bk. i. chaps. 1-8; Keckermann, *Systema Logicæ*, 1598; Gassendi, *Opera*, i. 35-66; Fabricius, *Specimen elenchicum historiæ logicæ*, 1699; Walch, *Parerga Academica* (1721), pp. 453-848; Darjes, *Via ad Veritatem*, appendix, 1755; Buhle, in *Commentat. Soc. Gotting.*, vol. x.; Fülleborn, *Beiträge z. Gesch. d. Phil.* (1794), pt. iv. pp. 160-80; Eberstein, *Gesch. d. Logik u. Metaphysik bei den Deutschen von Leibnitz bis auf gegenwärtige Zeit* (2nd ed., 1794), useful as a survey of the Wolffian logics; Calker, *Denklehre* (1822), pp. 12-198; Bachmann, *System der Logik* (1828), pp. 569-644; Mussmann, *De Logicæ ac Dialecticæ notione historica*, 1828;

Troxler, *Logik* (1830), vol. ii.; Sigwart, *De historia logicæ inter Græcos usque ad Socratem*, 1832; St Hilaire, *De la Logique d'Aristote* (1838), ii. pp. 93-312; Franck, *Esquisse d'une histoire de la logique*, 1838; Reiffenberg, *Principes de logique*, 1833 (with bibliography); Trendelenburg, *Gesch. d. Kategorienlehre*, 1846; Blakey, *History of Logic*, and *Essay on Logic* (2nd ed., 1848), with bibliographical appendix; Hoffmann, *Grundzüge einer Geschichte der Begriff der Logik in Deutschland von Kant bis Baader*, 1851; K. Fischer, *Logik u. Metaphysik* (2nd ed., 1865), pp. 16-182, a valuable critique of some modern doctrines; Rabus, *Logik und Metaphysik* (1868), i. pp. 123-242, excellent; Ueberweg, *System der Logik* (4th ed., 1874), pp. 15-66, excellent critical account; Ragnisco, *Storia critica delle Kategorie*, 1871, 2 vols.; Rabus, *Die neuesten Bestrebungen auf dem Gebiete der Logik bei den Deutschen*, 1880; Harms, *Geschichte der Logik*, 1881; Venn, *Symbolic Logic*, 1881 (introduction, and pp. 405-444), a valuable contribution to the history and bibliography of the application of symbolic methods in logic. The only good bibliography of logic is that given by Rabus in his *Logik u. Metaphysik*, i. pp. 453-518. Some of the older lexicons, *e.g.*, Lipenius, *Bibliotheca Realis* (1685), *s. vv.* "Logica," "Organon," "Dialectica," contain great store of bibliographical references. A complete bibliography is a desideratum.

Note B

HINDU SYSTEMS OF LOGIC

In almost all the Hindu systems of philosophy, as these are classified by the most recent authorities, indications are to be found of a more or less developed analysis of the process or method of reasoning, and therefore of a certain amount of logical theory. In two systems in particular the logical element is the most prominent feature. The *Nyâya*, or logical doctrine of Gotama, is in a very special sense the Hindu logic, while in the *Vaiseschika*, or Atomist system of

Kanada, there are many expansions of or additions to the *Nyâya*, though the prevailing interest is not logical.

The most accessible sources of information regarding the Hindu logic, Colebrooke's *Essays*, and Professor M. Müller's abstract (in the appendix to Archbishop Thomson's *Laws of Thought*), tend to mingle in an undesirable fashion what is special to the Nyâya doctrine, and what is added by Kanada and his followers. In order to appreciate the extent to which the analysis of reasoning has been carried in these early systems, it is advisable to restrict attention to the original exposition of the *Nyâya*.

The aim of Nyâya is the attainment of perfection, of bliss, through knowledge. But, to have knowledge in a systematic and complete fashion, it is requisite that the individual should know (or should be capable of organising his knowledge in reference to) the sixteen great topics or heads of discussion. These, as enumerated by Gotama, are—(1) proof; (2) the objects of proof; (3) doubt; (4) motive; (5) the illustration or example for discussion; (6) the final assertion; (7) the enumeration of the five members of the final assertion; (8) confirmatory argument; (9) the conclusion, the defined judgment; (10) the objection; (11) controversy; (12) deceptive counter argument; (13) apparent reason or sophism; (14) fraud or wilfully deceptive argument, ruse; (15) futile argument or self-contradictory counter argument; (16) conclusive refutation. Inspection of these at once shows that they represent stages in dialectic or in the process of clearing up knowledge by discussion.

The generalia, *i.e.*, the kinds of proof, described as four in number—sense-perception, inference (either from cause to effect, from effect to cause, or from community of nature, *i.e.*, in a wide sense, analogy), comparison (analogy in a stricter significance), tradition—and the things about which proof may be exercised, under which a twelvefold division is given by Gotama, and enlarged in endless detail by his commentators, who introduce thereunder much of Kanada's system, are first laid down as the basis for the whole. Then follows (Nos. 3-6) the progress from doubt, which first calls for reasoning or proof, through motive, to position of the problem in the form of an example or case, and to the general assertion, as having valid grounds.

The analysis of the grounds of assertion is then given, and here we have what corresponds more particularly to the syllogism as known to us. Five members are signalised: (1) the thesis or proposition to be proved; (2) the reason, or intermediate ground by which the subject of the proposition is linked on to an explanatory principle; (3) the explanatory principle; (4) the application of this explanatory principle; (5) the statement of the conclusion as following from the application. Thus, in the example usually given—(1) *thesis*, this mountain is fiery; (2) *intermediate ground*, because it smokes; (3) *explanatory principle*, whatever smokes is fiery, as, for instance, a hearth; (4) *application*, therefore this mountain is fiery; (5) *statement of conclusion*, the mountain, then, is fiery, because it smokes. There can be no doubt that in this somewhat unsystematic arrangement we have the outlines of syllogistic argument. Considerable obscurity, however, rests over the third member, and it is only partially cleared up when we proceed to the next topic, which may perhaps be translated confirmatory argument. Here the essence of the argument appears to be a regress from the known mark to the fundamental quality from which it follows. Thus, *e.g.*, if it were said *the mountain is not fiery*, then the argument would be adduced, but *the mountain smokes*, and what is not fiery does not smoke. Apparently there is involved the assumption that the mark is a necessary consequence of the primary quality, but the exposition is obscure, and, doubtless, connects itself with the principles of causal connection recognised by Hindu thinkers. (See Williams, as below, pp. 73-4).

When the conclusion has thus been confirmed, when the negation of the ground has been shown to fail in explaining the observed fact, the thesis may be stated in an absolute and definitive form (topic 9). The remaining seven topics are then concerned with the discussion which may arise when an opponent brings forward objections to the conclusion. This he must do by positing his antithesis (10), whereupon issue may be joined (11). Should the adversary be unable to establish his antithesis, he may resort to deceit, bringing forward arguments, illogically arranged and devoid of force (12), which soon leads to the employment of sophisms (13) or merely apparent arguments, and even to

deceitful ruses (14). Under these topics the *Nyâya* signalises and discusses various well-known forms of fallacy. The destruction of all these fallacious arguments reduces the opponent to the employment of futile, irrelevant responses, which undermine his own position (15), and the exposure of which completes his discomfiture and reduces him to silence (16).

Expositions of this dialectic system are not yet available in such kind and amount as would enable one to do full justice to it. Evidently much patience and a very considerable knowledge of the current philosophical view would be requisite in order to appreciate at their true worth many apparently formal, and in some cases dubious, divisions. Of accounts which may be consulted the following seem the more important: Colebrooke's *Essays on the Religion and Philosophy of the Hindus*, from which the expositions in Ritter (*Ges. d. Phil.*, iv. 382 *sq.*), Hegel (*Werke*, xiii. 161-167), and Cousin (*Histoire Générale*, Leçon ii.) are taken; Ward's *Account of the History, Literature, and Religion of the Hindoos* (4 vols., 1811; later editions, with title altered, in 1815, 1817, 1821); Windischmann, *Philosophie im Fortgange der Weltgeschichte* (1834), specially pp. 1895-1920; M. Müller, appendix to Thomson's *Laws of Thought;* Rozenkranz, *Die Modificationen der Logik* (1846), pp. 184-97. Williams, *Indian Wisdom*, pp. 71-88; St Hilaire, articles "Indiens," "Gotama," "Nyâya," "Kanada," in the *Dictionnaire Philosophique*, and translation, with commentary, of part of Gotama's "Sûtras," in the *Mémoires de l'Académie des Sciences Morales et Politiques*, tom. iii.

Note C

RAMUS

The logical theories of Ramus acquired for a brief period a factitious importance from their connection with the general revolt against Aristotelianism, and with the Protestant struggle against the Roman Catholic authority.

In themselves they have no particular value, nor indeed much originality, and the exposition of them by their author, always rather literary than philosophic, adds nothing of strength or interest. In comparison with the Aristotelian analysis of the forms and methods of thinking, the few alterations of statement, and generally the thin residuum of logical theory, which characterise Ramist work, appear as singularly insignificant. Nor have any of the special peculiarities of the Ramist logic exercised influence on the history of logical doctrines. The keenness of the controversy which raged in so many of the centres of learning between the Aristotelians and the total or partial Ramists is explicable only as having reference to differences which were merely symbolised by the apparent difference in logical doctrine.

In the Protestant universities and seminaries generally the Ramist logic obtained, and for some time kept, a firm footing. In Scotland, through Melville, Buchanan, and the Earl of Murray, who had been a pupil of Ramus, his system was installed as the orthodox staple of logical training, and such records as remain of Scottish university education during the troubled sixteenth century would undoubtedly exhibit the traces of this new movement. In England, Cambridge alone, always disposed to reject the authority of Aristotle, and generally more open to new ideas than the sister university, was a stronghold of Ramism, and, apart from special works of Ramist tendency, the influence of the new doctrine is discernible in the writings of more than one Cambridge alumnus. William Temple, a friend of Sir Philip Sidney, and an official of the university, published a volume of *Scholia in Rami Dialecticam*, 1591; George Downam, prælector on logic, wrote commentaries *In Petri Rami Dialecticam*, 1606; and Milton, in 1672, expanded the *Dialectica* in his *Artis Logicæ Plenior Institutio*. Marlowe's *Faustus*, and his *Massacre of St Bartholomew*, show how familiar Ramist phraseology and the personality of Ramus must have been to an alumnus of Cambridge, while Bacon, with well-grounded objection to much of the Ramist method, expounds the system of logic with unmistakable reference to the Ramist principles and method of arrangement. There is a monograph on Ramus by Ch. Waddington

with a good bibliography—*Ramus (Pierre de la Ramée): sa Vie, ses Écrits, et ses Opinions*, Paris, 1856—and a slighter work, mainly biographical, by Ch. Desmaze (*P. Ramus, Professeur au Collége de France: sa Vie, ses Écrits, sa Mort*, 1515-72, Paris, 1864). In Lipenius (*Bibliotheca Realis, s.v.* "Ramus") will be found a long list of writings for and against the Ramist logic. The history of the movement is also given in Buhle (*Gesch. d. neuern Phil.*, ii. 680-702), Tennemann (*Gesch. d. Phil.*, ix. pp. 420-42), Du Boulay (*Hist. Univer. Paris*, tom. iv.), Crevier (*Hist. de l'Univ. de Paris*, vol. v.), in Jo. Hermannus ab Elswich (*Schediasma de varia Aristotelis in scholis Protestantium fortuna*, §§ 21-29), De Launoy (*De Varia Aristot. in Acad. Paris. fortuna*, cap. xiii.), and in Bayle (*Dictionnaire, s.v.* "Ramus").

SUPPLEMENTARY ARTICLES

I

CATEGORY

Category, a term first introduced into the philosophical vocabulary by Aristotle, means etymologically an accusation. Even in the writings of Aristotle the word occurs once or twice in this its primary acceptation, but generally it has there a definite and technical signification. So also in Aristotle the verb *κατηγορεῖν*, to accuse, takes the specific logical sense, to predicate; *τὸ κατηγορούμενον* becomes the predicate; and *κατηγορικὴ πρότασις* may be translated as affirmative proposition. But though the word thus received a new signification from Aristotle, it is not on that account certain that the thing it was taken to signify was equally a novelty in philosophy. We do find in the records of Oriental and early Greek thought something corresponding to the Aristotelian classification.

Our knowledge of Hindu philosophy, and of the relations in which it may have stood to Greek speculation, is not yet adequate to give decisive answers to various questions

that naturally arise on observation of their many resemblances; and it might therefore appear irrelevant to introduce into an historical notice of a peculiarly Western doctrine any reference to its Eastern counterpart. Yet the similarity between the two is so striking that, if not historically connected, they must at least be regarded as expressions of similar philosophic wants. The Hindu classification to which we specially refer is that of Kanada, who lays down six categories, or classes of existence, a seventh being generally added by the commentators. The term employed is Padârtha, meaning "signification of a word." This is in entire harmony with the Aristotelian doctrine, the categories of which may with truth be described as significations of simple terms, *τὰ κατὰ μηδεμίαν συμπλοκὴν λεγόμενα*. The six categories of Kanada are Substance, Quality, Action, Genus, Individuality, and Concretion or Co-inherence. To these is added Non-Existence, Privation, or Negation. *Substance* is the permanent sub-strate in which *Qualities* exist. *Action*, belonging to or inhering in substances, is that which produces change. *Genus* belongs to substance, qualities, and actions; there are higher and lower genera. *Individuality*, found only in substance, is that by which a thing is self-existent and marked off from others. *Concretion* or Co-inherence denotes inseparable or necessary connection, such as that between substance and quality. Under these six classes, *γένη τοῦ ὄντος*, Kanada then proceeds to range the facts of the universe.[1]

Within Greek philosophy itself there were foreshadow-

[1] For details of this and other Hindu systems see Colebrooke, *Essays;* H. H. Wilson, *Essays;* Williams, *Indian Wisdom;* Gough's *Vaiseshika-Sutras;* M. Müller, *Sanskrit Literature*, and particularly his Appendix to Thomson's *Laws of Thought.*

ings of the Aristotelian doctrine, but nothing so important as to warrant the conclusion that Aristotle was directly influenced by it. Doubtless the One and Many, Being and Non-Being, of the Eleatic dialectic, with their subordinate oppositions, may be called categories, but they are not so in the Aristotelian sense, and have little or nothing in common with the later system. Their starting-point and results are wholly diverse. Nor does it appear necessary to do more than mention the Pythagorean table of principles, the number of which is supposed to have given rise to the decuple arrangement adopted by Aristotle. The two classifications have nothing in common; no term in the one list appears in the other; and there is absolutely nothing in the Pythagorean principles which could have led to the theory of the categories.[1]

One naturally turns to Plato when endeavouring to discover the genesis of any Aristotelian doctrine, and undoubtedly there are in the Platonic writings many detached discussions in which the matter of the categories is touched upon. Special terms also are anticipated at various times, *e.g.*, ποιότης in the *Theætetus*, ποιεῖν and πάσχειν in the *Gorgias*, and πρός τι in the *Sophist*.[2] But there does not seem to be anything in Plato which one could say gave occasion directly and of itself to the Aristotelian doctrine; and, even when we take a more comprehensive view of the Platonic system and inquire what in it corresponds to the widest definition of categories, say as ultimate elements of thought and existence, we receive no very definite answer.

[1] The supposed origin of that theory in the treatise περὶ τοῦ παντός, ascribed to Archytas (c. 428-347 B.C.), has been proved to be an error. The treatise itself dates in all probability from the Neo-Pythagorean schools of the second century A.D.

[2] Prantl, *Ges. d. Logik*, i. 74-75; Trendelenburg, *Kategorienlehre*, 209, *n.*

The Platonic dialectic never worked out into system, and only in two dialogues do we get anything like a list of ultimate or root-notions. In the *Sophist*, Being, Rest, and Motion (*τὸ ὂν αὐτὸ καὶ στάσις καὶ κίνησις*) are laid down as *μέγιστα τῶν γενῶν*.[1] To these are presently added the Same and the Other (*ταὐτὸν καὶ θάτερον*), and out of the consideration of all five some light is cast upon the obscure notion of Non-Being (*τὸ μὴ ὄν*). In the same dialogue (262, *sq.*) is found the important distinction of *ὄνομα* and *ῥῆμα*, noun and verb. The *Philebus* presents us with a totally distinct classification into four elements—the Infinite, the Finite, the Mixture or Unity of both, and the Cause of this unity (*τὸ ἄπειρον, τὸ πέρας, ἡ σύμμιξις, ἡ αἰτία*). It is at once apparent that, however these classifications are related to one another and to the Platonic system, they lie in a different field from that occupied by the Aristotelian categories, and can hardly be said to have anything in common with them.

The Aristotelian doctrine is most distinctly formulated in the short treatise *Categoriæ*, which generally occupies the first place among the books of the *Organon*. The authenticity of the treatise was doubted in early times by some of the commentators, and the doubts have been revived by such scholars as Spengel and Prantl. On the other hand, Brandis, Bonitz, and Zeller are of opinion that the tract is substantially Aristotle's. The matter is hardly one that can be decided either *pro* or *con* with anything like certainty; but this is of little moment, for the doctrine of the categories, even of the *ten* categories, does not stand or fall with only one portion of Aristotle's works.

It is surprising that there should yet be so much uncertainty as to the real significance of the categories, and that

[1] *Soph.*, 254, D.

we should be in nearly complete ignorance as to the process of thought by which Aristotle was led to the doctrine. On both points it is difficult to extract from the matter before us anything approaching a satisfactory solution. The terms employed to denote the categories have been scrutinised with the utmost care, but they give little help. The most important—*κατηγορίαι τοῦ ὄντος* or *τῆς οὐσίας*, *γένη τοῦ ὄντος* or *τῶν ὄντων*, *γένη* simply, *τὰ πρῶτα* or *τὰ κοινὰ πρῶτα*, *αἱ πτώσεις*, or *αἱ διαιρέσεις*—only indicate that the categories are general classes into which Being as such may be divided, that they are *summa genera*. The expressions *γένη τῶν κατηγορίων* and *σχήματα τῶν κατηγορίων*, which are used frequently, seem to lead to another and somewhat different view. *Κατηγορία* being taken to mean that which is predicated, *γένη τῶν κατηγορίων* would signify the most general classes of predicates, the framework into the divisions of which all predicates must come. To this interpretation there are objections. The categories must be carefully distinguished from predicables; in the scholastic phraseology the former refer to *first intentions*, the latter to *second intentions*—*i.e.*, the one denote real, the other logical connection. Further, the categories cannot without careful explanation be defined as predicates; they are this and something more. The most important category, *οὐσία*, in one of its aspects cannot be predicate at all.

In the *Categoriæ* Aristotle prefixes to his enumeration a grammatico-logical disquisition on homonyms and synonyms, and on the elements of the proposition, *i.e.*, subject and predicate. He draws attention to the fact that things are spoken of either in the connection known as the proposition, *e.g.*, "a man runs," or apart from such connection, *e.g.*, "man" and "runs." He then proceeds, "Of things spoken of apart from their connection in a proposition (*τῶν*

κατὰ μηδεμίαν συμπλοκὴν λεγομένων), each signifies either Substance (οὐσία), or Quantity (ποσόν), or Quality (ποιόν), or Relation (πρός τι), or Where (*i.e.*, Place, ποῦ), or When (*i.e.*, Time, ποτέ), or Position (κεῖσθαι), or Possession (ἔχειν), or Action (ποιεῖν), or Passion (πάσχειν). Οὐσία, the first category, is subdivided into πρώτη οὐσία or primary substance, which is defined to be τόδε τι, the singular thing in which properties inhere, and to which predicates are attached, and δεύτεραι οὐσίαι, genera or species which can be predicated of primary substances, and are therefore οὐσία only in a secondary sense. Nevertheless, they too, after a certain fashion, signify the singular thing, τόδε τι (*Categ.*, p. 3b 12, 13). It is this doctrine of πρώτη οὐσία that has raised doubts with regard to the authenticity of the *Categoriæ*. But the tenfold classification, which has also been captiously objected to, is given in an acknowledged writing of Aristotle's (see *Topica*, i. 9, p. 103b 20).[1] At the same time it is at least remarkable that in two places where the enumeration seems intended to be complete (*Met.*, p. 1017a 25; *An. Pos.*, i. 22, p. 83a 21), only eight are mentioned, ἔχειν and κεῖσθαι being omitted. In other passages[2] six, five, four, and three are given, frequently with some addition, such as καὶ αἱ ἄλλαι κατηγορίαι. It is also to be observed that, despite of this wavering, distinct intimations are given by Aristotle that he regarded his list as complete, and he uses phrases which would seem to indicate that the division had been exhaustively carried out. He admits certainly that some predicates which come under one category might be referred to another, but he declines to deduce

[1] Against this passage even the cross-grained Prantl can raise no objection of any moment; see *Ges. der Logik*, i. 206, *n.*

[2] See Bonitz, *Index Aristotelicus*, *s.v.*, and Prantl, *Ges. d. Log.*, i. 207.

all from one highest class, or to recognise any relation of subordination among the several classes.

The full import of the categories will never be adequately reached from the point of view taken up in the *Categoriæ*, which bears all the marks of an early and preliminary study. For true understanding we must turn to the *Metaphysics*, where the doctrine is handled at large. The discussion of Being in that work starts with a distinction that at once gives us a clue. Τὸ ὄν is spoken of in many ways; of these four are classified—*τὸ ὂν κατὰ συμβεβηκός, τὸ ὂν ὡς ἀληθές, τὸ ὂν δυνάμει καὶ ἐνεργείᾳ*, and *τὸ ὂν κατὰ τὰ σχηματὰ τῶν κατηγορίων*. It is evident from this that the categories can be regarded neither as purely logical nor as purely metaphysical elements. They indicate the general forms or ways in which Being can be predicated; they are determinations of Being regarded as an object of thought, and consequently as matter of speech. It becomes apparent also why the analysis of the categories starts from the singular thing, for it is the primary form under which all that is becomes object of knowledge, and the other categories modify or qualify this real individual. *Πάντα δὲ τὰ γιγνόμενα ὑπό τέ τινος γίγνεται καὶ ἔκ τινος καὶ τί. Τὸ δὲ τί λέγω καθ' ἑκάστην κατηγορίαν· ἢ γὰρ τόδε ἢ ποσὸν ἢ ποιὸν ἢ ποῦ* (*Met.*, p. 1032a 13-15). . . . The categories, therefore, are not logical forms but real predicates; they are the general modes in which Being may be expressed. The definite thing, that which comes forward in the process from potentiality to full actuality, can only appear and be spoken of under forms of individuality, quality, quantity, and so on. The nine later categories all denote entity in a certain imperfect fashion.

The categories then are not to be regarded as heads of predicates, the framework into which predicates can be

thrown. They are real determinations of Being—*allgemeine Bestimmtheiten*, as Hegel calls them. They are not *summa genera* of existences, still less are they to be explained as a classification of nameable things in general. The objections Mill has taken to the list are entirely irrelevant, and would only have significance if the categories were really—what they are not—an exhaustive division of concrete existences. Grote's view (*Aristotle*, i. 108) that Aristotle drew up his list by examining various popular propositions, and throwing the different predicates into genera, "according as they stood in different logical relation to the subject," has no foundation. The relation of the predicate category to the subject is not entirely a logical one; it is a relation of real existence, and wants the essential marks of the propositional form. The logical relations of τὸ ὄν are provided for otherwise than by the categories.

Aristotle has given no intimation of the course of thought by which he was led to his tenfold arrangement, and it seems hopeless to discover it. Trendelenburg in various essays has worked out the idea that the root of the matter is to be found in grammatical considerations, that the categories originated from investigations into grammatical functions, and that a correspondence will be found to obtain between categories and parts of speech. Thus, Substance corresponds to noun substantive, Quantity and Quality to the adjective, Relation partly to the comparative degree and perhaps to the preposition, When and Where to the adverbs of time and place, Action to the active, Passion to the passive of the verb, Position (κεῖσθαι) to the intransitive verb, ἔχειν to the peculiar Greek perfect. That there should be a very close correspondence between the categories and grammatical elements is by no means surprising; that the one were deduced from the other is

both philosophically and historically improbable. Reference to the detailed criticisms of Trendelenburg by Ritter, Bonitz, and Zeller will be sufficient.

Aristotle has also left us in doubt on another point. Why should there be only *ten* categories? and why should these be the ten? Kant and Hegel, it is well known, signalise as the great defect in the Aristotelian categories the want of a principle, and yet some of Aristotle's expressions would warrant the inference that he *had* a principle, and that he thought his arrangement exhaustive. The leading idea of all later attempts at reduction to unity of principle, the division into substance and accident, was undoubtedly not overlooked by Aristotle, and Brentano has collected with great diligence passages which indicate how the complete list might have been deduced from this primary distinction. His tabular arrangements (pp. 175, 177) are particularly deserving of attention. The results, however, are hardly beyond the reach of doubt.

There was no fundamental change in the doctrine of the categories from the time of Aristotle to that of Kant, and only two proposed re-classifications are of such importance as to require notice. The Stoics adopted a fivefold arrangement of highest classes, *γενικώτατα*. Τὸ ὄν or *τί*, Being, or somewhat in general, was subdivided into *ὑποκείμενα* or subjects, *ποιά* or qualities in general, which give definiteness to the blank subject, *πῶς ἔχοντα*, modes which further determine the subject, and *πρός τι πῶς ἔχοντα*, definite relative modes. These categories are so related that each involves the existence of one higher than itself, thus there cannot be a *πρός τι πῶς ἔχον* which does not rest upon or imply a *πῶς ἔχον*, but *πῶς ἔχον* is impossible with-

[1] Brentano, *Bedeutung des Seienden nach Aristoteles*, pp. 148-178.

out *ποιόν*, which only exists in *ὑποκείμενον*, a form or phase of *τὸ ὄν*.[1]

Plotinus, after a lengthy critique of Aristotle's categories, sets out a twofold list. *Τὸ ἕν, κίνησις, στάσις, ταὐτότης, ἑτερότης* are the primitive categories (*πρῶτα γένη*) of the intelligible sphere. *Οὐσία, πρός τι, ποιά, ποσόν, κίνησις* are the categories of the sensible world. The return to the Platonic classification will not escape notice.

Modern philosophy, neglecting altogether the dry and tasteless treatment of the Aristotelian doctrine by scholastic writers, gave a new, a wider, and deeper meaning to the categories. They now appear as ultimate or root notions, the metaphysical or thought elements, which give coherence and consistency to the material of knowledge, the necessary and universal relations which obtain among the particulars of experience. There was thus to some extent a return to Platonism; but in reality, as might easily be shown, the new interpretation was, with due allowance for difference in point of view, in strict harmony with the true doctrine of Aristotle. The modern theory dates in particular from the time of Kant, who may be said to have reintroduced the term into philosophy. Naturally there are some anticipations in earlier thinkers. The Substance, Attribute, and Mode of Cartesianism can hardly be classed among the categories; nor does Leibniz's chance suggestion of a fivefold arrangement into Substance, Quantity, Quality, Action and Passion, and Relations, demand any particular notice. Locke, too, has a classification into Substances, Modes, and Relations, but in it he has manifestly no intention of drawing up a table of categories. What in his system

[1] For detailed examination of the Stoic categories, see Prantl, *Ges. d. Logik*, i. 428, *sqq.*; Zeller, *Ph. d. Gri.*, iii. 1, 82, *sqq.*; Trendelenburg, *Kateg.*, p. 217.

corresponds most nearly to the modern view of these elements is the division of kinds of real predication. In all judgments of knowledge we predicate either (1) Identity or Diversity, (2) Relation, (3) Coexistence, or necessary connection, or (4) Real existence. From this the transition was easy to Hume's important classification of *philosophical relations* into those of Resemblance, Identity, Time and Place, Quantity or Number, Quality, Contrariety, Cause and Effect.

These attempts at an exhaustive distribution of the necessary relations of all objects of knowledge indicate the direction taken by modern thought, before it received its complete expression from Kant.

The doctrine of the categories is the very kernel of the Kantian system, and, through it, of later German philosophy. To explain it fully would be to write the history of that philosophy. The categories are called by Kant root-notions of the understanding (*Stammbegriffe des Verstandes*), and are briefly the specific forms of the *a priori* or formal element in rational cognition. It is this distinction of matter and form in knowledge that marks off the Kantian from the Aristotelian doctrine. To Kant knowledge was only possible as the synthesis of the material or *a posteriori* with the formal or *a priori*. The material to which *a priori* forms of the understanding were applied was the sensuous content of the pure intuitions, time and space. This content could not be *known* by sense, but only by intellectual function. But the understanding in the process of knowledge makes use of the universal form of synthesis, the judgment; intellectual function is essentially of the nature of judgment or the reduction of a manifold to unity through a conception. The specific or type forms of such function will, therefore, be expressed in

judgments; and a complete classification of the forms of judgments is the key by which one may hope to discover the system of categories. Such a list of judgments Kant thought he found in ordinary logic, and from it he drew up his well-known scheme of the twelve categories. These forms are the determinations of all objects of experience, for it is only through them that the manifold of sense can be reduced to the unity of consciousness, and thereby constituted experience. They are *a priori* conditions, subjective in one sense, but objective as being universal, necessary, and constitutive of experience.

The table of logical judgments with corresponding categories is as follows:—

Judgments.		Categories.
Universal ...	I. Of Quantity	Unity.
Particular ...		Plurality.
Singular		Totality.
Affirmative ...	II. Of Quality	Reality.
Negative		Negation.
Infinite		Limitation.
Categorical ...	III. Of Relation	Inherence and Subsistence (Substance and Accident).
Hypothetical		Causality and Dependence (Cause and Effect).
Disjunctive...		Community (Reciprocity).
Problematical	IV. Of Modality	Possibility and Impossibility.
Assertoric ...		Existence and Non-Existence.
Apodictic ...		Necessity and Contingency.

Kant, it is well known, criticises Aristotle severely for having drawn up his categories without a principle, and claims to have disclosed the only possible method by which an exhaustive classification might be obtained. What he criticised in Aristotle is brought against his own procedure by the later German thinkers, particularly Fichte and Hegel. And in point of fact it cannot be denied that Kant has allowed too much completeness to the ordinary logical dis-

tribution of propositions; he has given no proof that in these forms are contained all species of synthesis, and in consequence he has failed to show that in the categories, or pure conceptions, are contained all the modes of *a priori* synthesis. Further, his principle has so far the unity he claimed for it, the unity of a single function, but the specific forms in which such unity manifests itself are not themselves accounted for by this principle. Kant himself hints more than once at the possibility of a completely rational system of the categories, at an evolution from one single movement of thought, and in his *Remarks on the Table of the Categories* gave a pregnant hint as to the method to be employed. From any complete realisation of this suggestion Kant, however, was precluded by one portion of his theory. The categories, although the necessary conditions under which alone an object of experience can be thrown, are merely forms of the mind's own activity; they apply only to sensuous and consequently subjective material. Outside of and beyond them lies the thing-in-itself, the blankest and emptiest of abstractions, which yet to Kant represented the ultimately real.

This subjectivism was a distinct hiatus in the Kantian system, and against it principally Fichte and Hegel directed criticism. It was manifest that at the root of the whole system of categories there lay the synthetising unity of self-consciousness, and it was upon this unity that Fichte fixed as giving the possibility of a more complete and rigorous deduction of the pure notions of the understanding. Without the act of the Ego, whereby it is self-conscious, there could be no knowledge, and this primitive act or function must be, he saw, the *position* or affirmation of itself by the Ego. The first principle then must be that the Ego posits itself as the Ego, that the Ego = Ego, a principle which is un-

conditioned both in form and matter, and therefore capable of standing absolutely first, of being the *prius* in a system. Metaphysically regarded this act of self-position yields the categories of Reality. But, so far as matter is concerned, there cannot be affirmation without negation, *omnis determinatio est negatio.* The determination of the Ego presupposes or involves the Non-Ego. The form of the proposition in which this second act takes to itself expression, the Ego is not = Not-Ego, is unconditioned, not derivable from the first. It is the absolute antithesis to the primitive thesis. The category of Negation is the result of this second act. From these two propositions, involving absolutely opposed and mutually destructive elements, there results a third which reconciles both in a higher synthesis. The notion in this third is determination or limitation; the Ego and Non-Ego limit, and are opposed to, one another. From these three positions Fichte proceeds to evolve the categories by a series of thesis, antithesis, and synthesis.

In thus seizing upon the unity of self-consciousness as the origin for systematic development, Fichte has clearly taken a step in advance of, and yet in strict harmony with, the Kantian doctrine. For, after all that can be said as to the demonstrated character of formal logic, Kant's procedure was empirical, and only after the list of categories had been drawn out, did he bring forward into prominence what gave them coherence and reality. The peculiar method of Fichte, also, was nothing but a consistent application of Kant's own *Remark on the Table of the Categories.* Fichte's doctrine, however, is open to some of the objections advanced against Kant. His method is too abstract and external, and wants the unity of a single principle. The first two of his fundamental propositions stand isolated

from one another, not to be resolved into a primitive unity. With him, too, the whole stands yet on the plane of subjectivity. He speaks, indeed, of the universal Ego as distinct from the empirical self-consciousness; but the universal does not rise with him to concrete spirit. Nevertheless the *Wissenschaftslehre* contains the only real advance in the treatment of the categories from the time of Kant to that of Hegel.[1] This, of course, does not imply that there were not certain elements in Schelling, particularly in the *Transcendental Idealism*, that are of value in the transition to the later system; but on the whole it is only in Hegel that the whole matter of the Kantian categories has been assimilated and carried to a higher stage.

The Hegelian philosophy, in brief, is a system of the categories; and, as it is not intended here to expound that philosophy, it is impossible to give more than a few general and quite external observations as to the Hegelian mode of viewing these elements of thought. With Kant, as has been seen, the categories were still subjective, not as being forms of the individual subject, but as having over against them the world of *noumena* to which they were inapplicable. Self-consciousness, which was, even with Kant, the *nodus* or kernel whence the categories sprang, was nothing but a logical centre,—the reality was concealed.

[1] It does not seem necessary to do more than refer to the slight alterations made on Kant's Table of Categories by Herder (in the *Metakritik*), by Maimon in the *Propadeutik zu einer neuen Theorie des Denkens*), by Fries (in the *Neue Kritik der Vernunft*), or by Schopenhauer, who desired to reduce all the categories to one—that of Causality. We should require a new philosophical vocabulary even to translate the extraordinary compounds in which Krause expounds his theory of the categories. Notices of the changes introduced by Rosmini, and of Gioberti's remarkable theory, will be found in Ragnisco's work referred to below.

There was thus a dualism, to overcome which is the first step in the Hegelian system. The principle, if there is to be one, must be universally applicable, all-comprehensive. Self-consciousness is precisely the principle wanted; it is a unity, an identity, containing in itself a multiplicity. The universal in absolute self-consciousness is just pure thinking, which in systematic evolution is the categories; the particular is the natural or multiform, the external as such; the concrete of both is spirit, or self-consciousness come to itself. The same law that obtains among the categories is found adequate to an explanation of the external thing which had so sadly troubled Kant. The categories themselves are moments of the universal of thought, type forms, or definite aspects which thought assumes; determinations, *Bestimmungen*, as Hegel most frequently calls them. They evolve by the same law that was found to be the essence of ultimate reality—*i.e.*, of self-consciousness. The complete system is pure thought, the Universal *par excellence.*

After the Hegelian there can hardly be said to have been a philosophical treatment of the categories in Germany, which is not more or less a criticism of that system. It does not seem necessary to mention the unimportant modifications introduced by Kuno Fischer, Erdmann, or others belonging to the school. In the strongly-opposed philosophy of Herbart, the categories can hardly be said to hold a prominent place. They are, with him, the most general notions which are psychologically formed, and he classifies them as follows: (1) Thing, either as product of thought, or as given in experience; (2) Property, either qualitative or quantitative; (3) Relation; (4) The Negated. Along with these, he posits as categories of inner process—(1) Sensation, (2) Cognition, (3) Will, (4) Action. George,[1]

[1] *Lehrbuch der Metaphysik*, 1844.

who in the main follows Schleiermacher, draws out a table of categories which shows, in some points, traces of Herbartian influence. His arrangement by enneads, or series of nine, is fanciful, and wanting in inner principle.

The most imposing recent attempt at a reconstruction of the categories is that of Trendelenburg. To him the first principle, or primitive reality, is Motion, which is both real as external movement, and ideal as inner construction. The necessary conditions of Motion are Time and Space, which are both subjective and objective. From this point onwards are developed the mathematical (point, line, &c.) and real (causality, substance, quantity, quality, &c.) categories which appear as involved in the notion of motion. Matter cannot be regarded as a product of motion; it is the condition of motion; we must think something moved. All these categories, "under the presupposition of motion as the first energy of thought, are ideal and subjective relations; as also, under the presupposition of motion as the first energy of being, real and objective relations."[1] A serious difficulty presents itself in the next category, that of End (*Zweck*), which can easily be thought for inner activity, but can hardly be reconciled with real motion. Trendelenburg solves the difficulty only empirically, by pointing to the insufficiency of the merely mechanical to account for the organic. The consideration of Modality effects the transition to the forms of logical thought. On the whole, Trendelenburg's unique fact of motion seems rather a blunder. There is much more involved than he is willing to allow, and motion *per se* is by no means adequate to self-consciousness. His theory has found little favour.

Ulrici works out a system of the categories from a psychological or logical point of view. To him the funda-

[1] *Logische Untersuchungen*, i. 376-7.

mental fact of philosophy is the distinguishing activity (*unterscheidende Thätigkeit*) of thought. Thought is only possible by distinction, difference. The fixed points in the relations of objects upon which this activity turns are the categories, which may be called the forms or laws of thoughts. They are the aspects of things, notions under which things must be brought, in order to become objects of thought. They are thus the most general predicates or heads of predicates. The categories cannot be completely gathered from experience, nor can they be evolved *a priori;* but, by attending to the general relations of thought and its purely indefinite matter, and examining what we must predicate in order to know being, we may attain to a satisfactory list. Such list is given in great detail in the *System der Logik* (1852), and in briefer, preciser form in the *Compendium der Logik* (2nd ed., 1872); it is in many points well deserving of attention.

The definition of the categories by the able French logician Renouvier, in some respects resembles that of Ulrici. To him the primitive fact is Relation, of which all the categories are but forms. "The categories," he says, "are the primary and irreducible laws of knowledge, the fundamental relations which determine its form and regulate its movements." His table and his criticism of the Kantian theory are both of interest.[1]

The criticism of Kant's categories by Cousin and his own attempted classification are of no importance. Of more interest to us, though not of much more value, is the elaborate table drawn out by Sir W. Hamilton.[2] The generalised category of the *Conditioned* has but little

[1] *Essais de Critique Generale*, 2nd ed.; *La Logique*, i. pp. 184, 190, 207-225.

[2] *Discussions*, p. 577.

meaning, and the subordinate categories evolve themselves by no principle, but are arranged after a formal and quite arbitrary manner. They are never brought into connection with thought itself, nor could they be shown to spring from its nature and relations.

J. S. Mill has presented, "as a substitute for the abortive classification of Existences, termed the categories of Aristotle," the following as an enumeration of all nameable things: (1) Feelings, or states of consciousness; (2) The minds which experience these feelings; (3) Bodies, or external objects which excite certain of those feelings; (4) Successions and coexistences, likenesses and unlikenesses, between feelings or states of consciousness.[1] This classification proceeds on a quite peculiar view of the categories, and is only presented here for the sake of completeness.

Trendelenburg, *Geschichte der Kategorienlehre*, 1846; Ragnisco, *Storia critica delle Categorie*, 2 vols. 1871. For Aristotle's doctrine the most important, in addition to Brandis, Zeller, and the above, are Bonitz, *Sitzungsber. d. kön. Akad. d. Wissen.*, Wien, 1853, pp. 591-645; Prantl, *Ges. d. Logik*, i.; and Brentano, *Bedeutung des Seienden nach Aristoteles*, 1862. See also Schuppe, *Die Kategorien des Aristoteles*, 1866; Grote's *Aristotle*, i.; and the translations of the *Categoriæ* by Maimon, 1794, and Heydenreich, 1835.

[1] *Logic*, i. 83; *cf.* Bain, *Deductive Logic*, App. C.

II

LOTZE'S LOGIC

THE translation of the volumes in which Lotze, towards the close of his long career as thinker and teacher, began to arrange in systematic form the ripest fruits of his reflection, is a contribution of the highest value to English philosophical literature. The *Logic* and the *Metaphysic*—the untimely death of the author has deprived us of his work on Practical Philosophy — contain a treatment of the main speculative problems distinguished by acuteness, breadth of knowledge, critical caution, and profound sense of the deep importance of the questions discussed. The historical position of the author gives to these volumes a unique interest. For Lotze might fairly have been described as the one remaining link of connection between the great epoch of systematic speculation in Germany and the more recent age of detailed, scientific research. The character of his mind reflected his historical position. No thinker of any time has more thoroughly combined the speculative instinct of the constructive philosopher with the cautious, practical attitude of the trained scientific investigator. If it be the ideal of the philosopher to work

[1] *Mind*, January 1885.—A critical notice of the English translation of Lotze's *Logic* (Oxford, 1884).

into a harmonious conception those thoughts which are the deepest, most far-reaching, most characteristic of his age, it would be hard to point to any one who has realised the ideal more thoroughly than Lotze.

Lotze's very excellences as a thinker, however, have their consequent defects. His training had given him a profound distrust of constructive metaphysics, a distrust so strong as to be sometimes, if not unintelligent, at least unjust. Yet he is animated by the true speculative impulse, and through the panoply of his cautious reserve the reader of his earlier works could obtain partial glimpses of a comprehensive, well-knit metaphysical idea. The excessive caution of the writer rendered it hard to form any complete notion of his deepest views, and the several parts of his work had, therefore, all the obscurity that belongs to the isolated fragments of an imperfectly known whole. Even in these latest volumes, in which the manner is more scholastic, more regularly expository than was Lotze's wont, something of the same obscurity is to be detected. The various assumptions, distinctions, views, through which the exposition proceeds, wait for justification from the completed whole; even his metaphysic is not fairly before us, since we still want his treatment of the philosophy of religion.

The close interdependence of the several parts of Lotze's work is certainly in no sense an objection to them. On the contrary, Lotze's writing has no more valuable lesson to give the student of philosophy than to teach him the impossibility of abstracting and isolating within its magic sphere. But the continuous feeling of interdependence renders the exposition difficult, and in the *Logic* these difficulties seem to me of a very peculiar and instructive kind.

Before proceeding to give some account of what Lotze embodies under the old title of Logic, I may be allowed to express to the translators and editor of the volume the feelings of gratitude and respect for their labour which I feel assured all students of Logic in this country will share with me. The volume ought to do much for the study of Logic in England, and the translation, if not positively attractive as a piece of English, will at all events not repel or unduly baffle a reader. Lotze's style is never easy to reproduce ; it always has considerable force and eloquence, while in his latest work it is unusually compressed and full of meaning. An elegant version in English could not be forced within the bounds of the original, and the present translation, which, so far as I can judge, is extremely faithful and accurate, suffers only from the inevitable evil of compression. The translators—for the task has been co-operative—have done their work with great ability, and the editor is to be congratulated on the wonderfully uniform style which the whole presents. I have not examined the whole translation minutely, but a selection of certain chapters yielded so small a number of weaknesses, and these of so unimportant a kind, as to confirm the general impression derived from inspection of the whole. The rendering of technical terms has also been very successfully achieved, though due uniformity is not always maintained. The rendering "conception and association" for "Fassung und Verknüpfung" (p. 406) is somewhat misleading.

The *Logic*, as the title specifically indicates, falls into three books or sections. The first of these, Pure Logic, or Thought, is a systematic exposition of the forms in which the logical activity of mind proceeds. The second, Applied Logic, or Investigation, is a much less systematic

treatment of the various ways in which the confused, entangled mass of concrete experience is brought into conformity to the ideal forms of logical connection. The third, Methodology, or Knowledge, is a free discussion of the fundamental problem which emerges from the exposition of the logical activity of mind, the problem of the foundation of knowledge, of the relation between the forms of connection making up the logical ideal and the nature of the real to which experience points. In all three books the reader will find not merely much that will throw light upon logical difficulties, much that will suggest problems of a subtle and profound character, much that may correct hastily adopted theories, but also, to put it generally, a quantity of philosophic thinking so elevated in tone, so sagacious in procedure, as to afford mental exercise of the most improving kind. There is no logician who will not learn much from Lotze's work. On the multitude of interesting detailed questions that appear throughout the volume I do not propose to say anything, and in particular, I must here omit all that concerns the treatment of the commonly called Inductive Logic in the Second Book. The general point of view from which the methods of research are regarded seems to me most excellent; indeed, the only point from which they can be consistently and with profit regarded. And I merely call attention to the weighty and well-expressed note in which Lotze gives his opinion on the logical calculus. With regard to the whole Second Book, however, one must take the advice Lotze offers in his preface, "to regard it as an open market, where the reader may simply pass by the goods he does not want." It is more critical than systematic, and the treatment strengthens the opinion, which one might defend on general grounds, that the methods of scientific investiga-

tion and proof are not capable of being thrown into a rigidly coherent and logical form.

The main interest of the work is to be found in the general idea of the logical activity of thought which inspires the whole, and out of which the characteristics of the familiar logical forms are developed. It is by no means easy to give a complete account of this general idea, and Lotze has himself preferred to allow its features to become apparent in and through the details of the exposition. He deliberately declines to formulate his view as an introduction, either in the way of describing and assigning its exact position to the logical act or in the equivalent way of discussing the place Logic is to hold in a systematic scheme of philosophy. It is of service for the reader of the present work to consult the earlier treatment of Logic which the author put forward under the more immediate influence of the philosophical tendencies of the last generation, and which in essentials is reproduced in the first book of his later treatise. In the introduction to the small but richly suggestive *Logic* of 1843, Lotze discussed two main conceptions of Logic, those of Herbart and Hegel, by comparison with which he was enabled to define the two main features of his own doctrine, features which reappear, though less explicitly put forward, in the later work. On the one hand, while sharing with Herbart the view that the logical forms are to be assigned to the activity of thought, an activity of one specific mode of mental existence, he dissents from the conclusion which Herbart drew, that these logical forms had no validity or significance other than that which belonged to them as specially complicated expressions of the psychological mechanism. From psychology, from the natural history of the mental life, no light, he held, could be thrown on that which is the very essence

of the activity of thought. The same dissent led him to reject the purely formal functions which by Herbart were assigned to the logical connections of ideas. It would do injustice to the meaning of the notion, the judgment, the syllogism, if these were regarded simply as ways in which consistent ideas were put together, or inconsistent ideas held asunder. When we reflect over the real content of the several acts of conceiving, judging, reasoning, we cannot resist the conclusion that their significance is not exhausted by the mere statement of the mechanical conditions under which psychical facts combine or oppose one another. The unique objective reference which is essential to thought is not explicable in the terms ap propriate to the natural history of ideas.

On the other hand, Lotze as strongly dissented from the Hegelian conception of Logic, in which it appeared to him an arbitrary and indefensible identification of thought and reality was the mother-error. Thinking and reality are in essence distinct; however close may be their relations to one another, and however the two may stand as parts of the sum total of being, they are not rashly and as a first step to be identified. The conception of a Logic which should be at once an exhibition of the ways in which thought proceeds and of the essential forms of reality seemed to him confused and misleading. Thought after all is reconstructive in character; as he puts it in his later work, "the human mind does not stand at the centre of things but has a modest position somewhere in the extreme ramifications of reality." The formation of knowledge is a gradual process, and it would be absurd to suppose that there is even a precise correspondence, much less a substantial identity, between the tentative effects of thinking and the modes of real existence.

As in contrast to these opposed conceptions of Logic, Lotze contemplates the middle course which at once recognises the essentially *subjective* or *formal* character of the activity of thought, and at the same time gives full justice to the claim, which thought at all events makes for itself, to be in close relation with reality. "Logic is certainly formal in the sense that it is a theory of the operations of thinking through which the subject works its thought into knowledge; it is as certainly not formal in the sense that these forms of thought are mere psychical facts standing in no express relation to the problem of knowing the real. Logic is certainly not real, in the sense that its forms are elements of the essence of things, but it is real, in so far as these forms depend on elements of the essence of things, in that there lie in the nature of things motives which constrain the thinking spirit to take in the movement of its own thought exactly those forms of apprehending and conjoining objective fact" (*Logik*, 1843, p. 13). In the introduction to the present work, a shorter course is taken to define provisionally the scope of Logic, and the needful explanations appear only in the course of the detailed expositions. Thought as a specific function of the thinking spirit, operating on the material supplied in and through the mere mechanism of the soul, is taken to be a *means* to knowing. As *means* or instrument, it unites characteristics of its own and of that which stands as its correlate, the real to be known. It needs hardly to be said that even a provisional statement, the import of which is so grave, demands the most careful scrutiny. In terms it reads like much that one has been accustomed to meet in the ordinary text-books; the significance which Lotze attaches to it can only be understood when the whole of his work is taken into account, and it

is possible that a critic, with the utmost desire to be fair, may do injustice to a proposition so many-sided and subtle.

The earlier *Logic* was rather more open in its explanations. We read there that thought has its own specific nature, and therefore its forms have a character distinguishing them from the real which under any supposition is contrasted with thought. At the same time, these forms of thought, the acts of thinking, have a colouring due to the nature of the real or to something which is even more closely connected with the real than thought itself. This something is more closely defined as the metaphysical categories, the ultimate assumptions (*Voraussetzungen* is the term used) which reason finds itself compelled to make in regard to the real. Thus thought holds a peculiar and intermediate position. On the one hand, it is opposed to, and distinct from, the mere sequence and combinations of psychical experience, which the natural laws of mind bring forward; in each of its acts and forms there may be traced the special feature of critical reference to a ground or determining condition; and the succession of logical acts may be regarded as a series of steps through which the critical activity of thought proceeds in the attempt to arrange the whole material of experience as a coherent, determined reconstruction of reality. On the other hand, the forms of thought are not identical with the fundamental assumptions of reason in respect to the nature of the real; they are but ways in which the psychical experience, the *Vorstellungen* of the thinking spirit, is brought into conformity with these assumptions (*Logik*, 1843, pp. 18, 23).

The later work is less explicit in its introductory statements, but its procedure manifestly turns upon the same considerations. There is implied throughout, and more fully defined in the detailed discussion, a comprehensive

conception in which no opposition of the real and the spiritual experience of the individual is involved. Thought, as belonging specifically to the individual thinking spirit, may, indeed must, stand in such relations with the real as follow necessarily from their conjoint existence in the sum total of being. But its nature generally, and the characteristics of its particular forms, exhibit, when scrutinised, clear marks of the fundamental difference that obtains between them. The world of thought is the changeless, dateless realm of ideas, in which is no becoming, no development, no existence as fact. Ideas have validity, but not factual reality. They are true, but not existent. And though the animating principle of thought is, in the later work, expressed more cautiously, as the act of "adding to the reproduction or severance of a connection in ideas the accessory notion of a ground for their coherence or non-coherence," yet the exposition of the successive stages through which the principle finds realisation is dominated by the reference to metaphysical assumptions regarding the real. Much of the later work, the Third Book in particular, is but a free, semi-historical defence of the peculiar position assigned to thought.

Without offering for the present any criticism on the ultimate view which is involved in Lotze's method of regarding Logic, I would point out that Lotze finds himself in some difficulty when the question arises how the forms of this logical activity are to be discovered. It is by the notion of *ground*, applied to the conception of the contents of perceptive and representative experience, that is to say, by a rather easy psychological reflection, that he helps himself along, and makes the first all-important step. The mere notion of a ground for the combination or severance of ideas that may have come

about mechanically through the natural laws of mind, implies the consciousness of a distinction between the simply subjective play of thought and the content of those thoughts which seem to enjoy a peculiar species of objective being. No question with regard to validity or truth can possibly arise until the psychological data have undergone the remarkable process to which Lotze, following earlier thinkers, gives the name of Objectification. The *object*, be it remarked, and Lotze is careful to remark, is not to be simply identified with the real; it is for thought, in thought, and by thought. More closely examined, it will be seen that the act of objectifying is at once an act of *positing*, *i.e.*, setting a content before one, distinguishing and comparing. The characters of the posited content, the distinctive marks by which one object is opposed to another, the possibility of comparing, are given, not made by thought. In particular, Lotze thinks, it is a merely fortunate fact, that the world of cognisable stuff affords means of comparing and universalising. That things should present themselves as comparable in degree, number, and extensive quantity, is no necessity of reason, but a fact which thought has thankfully to accept, and without which its most complex acts would be deprived of their essential basis. These elementary processes, through which perceptive and reproductive experience receives form as knowable matter, have left traces of themselves in the fundamental types of grammatical forms; but they are to be viewed as preceding the specifically logical acts, as prerequisites for the critical activity of thought rather than as forming part of it. The main types of the logical act Lotze takes without further discussion. Concept, judgment, and syllogism are ways in which the problem thought sets before itself, that of reducing experience to a systematic

whole in which each combination or separation shall have its ground, is gradually solved. The activity of thought, which finds successively expression in the form of concept, judgment, syllogism, is a higher development of the same function through which the idea of an objective order became possible, and in its development presupposes and rests upon the results of that function. Logical thought, in fact, is to be regarded as a continuous criticism of the crudely formed experience in which ideas of individual facts and vague general representations of similarities are already given, a criticism animated by the single principle that for the conjunction or severance of facts in presentation adequate grounds can and must be disclosed. The concept, the judgment, the syllogism are modes in which *coherence* as opposed to mere conjunction of fact is represented. That it should be possible to obtain a coherent representation is a fortunate accident, depending on an arrangement of the real contents of experience which is not itself a necessary truth; for it is quite conceivable that, even to a spirit animated by the principle of logical connection, experience should offer a dislocated mass of isolated facts which would allow no exercise to its logical function. The same general consideration lends strength to the conclusion, for which other grounds may be adduced, that the forms of logical coherence are not to be rashly viewed as in themselves modes of connection of the real. The relations of universal and particular, of condition and consequence, have no *existence* as facts. They are valid forms of thought, and have a content of their own, but they have not existence as things or even as reciprocal modes of things. What their content is Lotze allows to appear only in the course of the exposition which traces their development; and he leaves much more obscure in the later treatise than

in the earlier *Logik* the answer which might be offered to the question, What determines the varieties of content? For it is not immediately apparent why the merely formal demand for coherence should obtain practical satisfaction in the way of concept, judgment, syllogism, or rather in the assumed relations of which these are the subjective modes of realisation. In the earlier *Logik* the reference to the ultimate metaphysical assumptions supplied a partial key to the difficulty: the concept there appeared as the mode of apprehending the logical substance; judgment as the way in which the relations of universal and particular, of determining rule and determined instance, of conditions and consequences, relations implicit in the content, were subjectively expressed; and syllogism as the mode of representing the systematic whole in which universal and particular, ground and consequence, rule and case are the isolated, abstract parts. In the later work, the scrutiny of the logical forms proceeds with greater freedom, and though it follows the same path, it makes less distinct reference to the underlying metaphysical question.

The essence of the Concept Lotze finds in the peculiar thought which accompanies the presented or represented features, whether mere singulars of perception or generalities formed by the unconscious operation of the discursive activity, the thought of the determining rule or basis. In the process of conceiving, the object, whether a genus or an individual, is viewed as containing in its content the determining rule from which follows the combination of marks making it up. This rule or logical basis is a higher universal than the mere generic image, and it is not formed by the mere omission of marks, which the ordinary logic takes to be the mode of formation of notions. Nor is the relation of rule to determined particulars exhaustively

given in that of whole and parts; there fall therefore to be rejected, as but clumsy adumbrations of the truth, many of the "properties of notions" with which formal logic has delighted itself.

The concept, however, is an imperfect expression of the logical activity. It is itself but a transitory form, midway between the immediate, confused, and incoherent knowledge of the object which is appropriate to perception and the completed cognition in which all that enters into the object would have its value, position, and relations adequately determined. Moreover, it simply places the determining rule alongside the specific features, whether constant or variable, of the objects conceived, and leaves it undecided how, precisely, we are to understand the relation of the universal to its particulars, of the logical substance to its accidents. A more definite attempt to express the nature of the thought-relation between the opposed elements is found in the Judgment. The essential factor in the judgment, the copula, has no other function than to convey the notion which we form of the relation which binds the material contents of experience into conceivable coherent form.

The instructive survey of the forms of judgment, occupying the two chapters of Lotze's First Book, raises many points of interest to the logician, but it is the less necessary to dwell on them since the theory has already been brought before the English reader, partly in Mr Bosanquet's "Logic as the Science of Knowledge," in *Essays in Philosophical Criticism*, partly in Mr F. H. Bradley's *Principles of Logic*. The main object of the survey is to determine the value of the form of judgment as a mode of expressing thought-relation among the contents of ideas (*i.e.*, of psychologically given experience).

It is a kind of criticism but little familiar to logicians; Hegel only, to whom Lotze owes here and throughout much more than he is disposed to acknowledge, has subjected the form of judgment to a similar analysis. Lotze himself is probably much influenced in his grouping of the modes of judgment by the general consideration of the successive grades of knowledge, from its crude indeterminate beginnings to the ideal goal of completed systematic insight; and this consideration supplies a serviceable key to the distribution adopted. The impersonal judgment, the simplest form, while bearing on its surface the mark of the distinction into subject and predicate, which is at once the essence and the perplexity of the judgment, yet leaves the subject entirely undetermined, and so throws little or no light on the kind of relation which in judgment as such is contemplated as uniting subject and predicate. The ordinary categorical judgment, asserting that the subject *is* the predicate, finds itself at once met and baffled by the question, How can one determined and distinct content of thought *be* another? References to the relation of substance and accident, thing and property, do but throw the difficulty forward and convert the simply assertive judgment into a more complex form. In his criticism of the categorical judgment Lotze traces the perplexity mainly to the contradiction between the form of judging and the law of identity; for while the one asserts that S (which is a determinate content) *is* P (another determinate content), thought, proceeding under the law of identity, refuses to contemplate an S which is anything but S, a P which is anything but P. It does not seem to me that the criticism is at all furthered by the appeal to this so-called law of thought; for the solution of the difficulty is to be found, and is found by Lotze, in

showing that the abstract conception of identity has no real application to the case in question. A thought which could proceed by affirming only identity of content is no thought at all. It would have been better simply to insist on the patent fact that the merely assertive judgment, the qualitative or positive judgment, fails to express what it proposes to express, fails to show how a unity is possible between the diverse logical marks of its two factors, the subject and the predicate. That the universal is in some way the particular, and *vice versâ*, that the individual is only a determinate, fully known fact when more than an isolated unit,—all this is implicit in the mere assertion contained in the simple, qualitative judgment; but the form of the judgment is wholly inadequate to the thought which is implied in it. Lotze, however, constantly tends to view the world of thought, of ideas, as that in which the bare, abstract rule of identity is the all-supreme law, and finds in this a peculiarity of thought which effectively distinguishes it from reality.

Escape from the perplexity of the categorical judgment Lotze finds, first, in the transformation which the assertion undergoes when it is quantitatively determined as expressing of all, or some of the subject, the previous predicate. Even here, however, as he insists, the logical form is unequal to the task thought has imposed on it. We find ourselves either in the position of reasserting a blank identity, or reduced to a repetition of the impersonal existential judgment. It is only in the hypothetical judgment, which, by its very form, denies the supreme validity of the abstract rule $A = A$, that the logical form of thinking finds for itself a means of expressing a relation of differences that is at once a unity for thought, and yet not a blank identity. The law of sufficient reason thus stands alongside of and

supplementary to the law of identity ; yet Lotze, true to his preconception of the nature of thought, will have it that the superior and fruitful principle is of but inferior validity, that it is no necessity but a fortunate fact, an assumption "the truth of which is guaranteed by the concentrated impression of all experience." One hardly knows what to make of this, or how to understand the curious property of thought, which, subject in its own nature to an absolute law of a most stringent, but perfectly worthless character, shall yet make an assumption violating its own law and delightedly find that the thinkable world conforms thereto. It is a specimen of Lotze's excessive caution, and perhaps the consequences that would seem to follow from it might be invalidated by some portion of his metaphysical theory of the real. I note it here as bearing on the general view which animates much of the author's polemic against other philosophies.

The final, most developed group of forms of judgment appears as supplying a much-needed addition to the hypothetical. In the latter, there appeared, in the only way which could satisfy thought, the principle that the individual is determined by the universal. The individual *is* not the universal, but it is individual only through conditions or grounds, the interconnection of which is itself represented only by a universal proposition. This interconnection justifies and explains the quantitative determination which appears in the general (or, as we might call it, *abstract*) judgment, in which the predicate P is asserted of S, *i.e.*, of any individual S, because this participates in the general characters of S from which follow as consequence the predicate P. And since it is not P vaguely or generally that follows a vague, indeterminate S, but a particular modification P_1, P_2, or P_3 which follows a modification of

S—S_1, S_2, or S_3—the general judgment finds its complement in the disjunctive. The disjunctive judgment, again, while the completest form in which, by judgment, the unity of subject and predicate can be expressed, has its mark of imperfection in the undetermined choice of alternatives which it offers. It shadows forth the union in thought of subject and predicate; but as it at the same time, while explicitly pointing to a systematic interconnection as the basis of such union, does not contain the interconnection, it finds its supplement in the Syllogism, the mode of thought in which the interconnections of the conditions with that which they bring into a unity of thought is formally expressed.

The serial arrangement of judgments finds its counterpart in the distribution of syllogistic forms; but here the material for discussion is too rich to allow of any thorough examination. It is good that attention should be drawn, as Lotze's chapter cannot fail to draw it, to the precise character of the forms of inference familiar to ordinary logic as the categorical, inductive, and analogical syllogisms, and to the inadequacy of these to discharge all the work which thought has to perform in framing a logically coherent conception of experience. The more complex forms, the quantitative and the classificatory, present problems of a special character; and on the whole one's feeling sometimes is that Lotze's method of transition is arbitrary and artificial. One misses the stringency of a connecting idea from which these varieties would follow, and though one thankfully accepts what Lotze frankly offers regarding the ideal type of completed, systematic cognition, it is not easy to understand its full drift or to perceive its bearing on other portions of his exposition. Without discussing these points, I proceed to notice the

general problem which underlies the whole work, and which is formally though unsystematically discussed in the Third Book, the problem of the relation between the structure of thought and the nature of reality.

Lotze has chosen to develop his views in a semi-historical fashion, criticising various conceptions of value that have come forward in the history of speculation, and defining his position in reference to the aspects of the whole problem so presented. The problem itself may be variously defined as an inquiry into the worth for reality of the forms of thought, or as an investigation of the nature and grounds of certainty in knowledge. The discussion of Scepticism yields two important results, on one of which at least there can be little misunderstanding. That the sceptical view of knowledge implies the principle that reason is capable of attaining truth, criticising its own procedure and determining the worth of grounds, is an argument not less strong because it is familiar and direct. But the radical notion of scepticism, that knowledge, by its very nature as a mediating process, as a connecting link between reality and the thinking spirit, is for ever incapable of attaining to a perfect cognisance of the real, is subtle and many-sided, requiring no small care in handling, if any result of value is to follow. Lotze, so to speak, turns the flank of the sceptical doctrine, by insisting that, after all, knowledge can be nothing but a mediating process, can be nothing but the systematising of what is given in the experience of the thinking spirit, and therefore that any question regarding the *truth* of knowledge must be expressed and discussed in terms that are appropriate to the matter in hand. The abstract nature of things, which presents itself as an element in the sceptical reasoning, is after all a conception, the notion of what the order of things must be;

and the problems which scepticism had formulated in an unintelligible and unanswerable fashion must be restated. It must be asked, what are the characteristics of assured and certain cognition within that world of knowledge in which only the venue lies? One form of answer, a significant and far-reaching thought, Lotze finds in the Platonic theory of a world of Ideas; and the discussion enables him to advance a further position of his own doctrine. The Ideal world may be the home of certain and consistent contents of thought; but the mode of existence of these thoughts, it must be definitely recognised, is not that of real being as things, or even of occurrence as events. They have validity, but not factual existence. Within themselves they may form a concatenated system, from point to point of which the thinking mind may proceed with the certainty of insight; but Plato could not explain, nor does it seem within the scope of the theory to explain, the kind of relation which must be thought between the realm of the eternally valid ideal contents and the reality of things. Even if we allow that in the Ideas is to be found a system of interconnected parts, the Platonic teaching afforded no answer to the deeper question, What are the ultimate elements or principles, and how are they related to the dependent portions of the system? The attempt to answer this new problem Lotze takes to be the gist of the opposed doctrines of modern philosophy in respect to the origin of knowledge, the *a priori* and the empirical. His criticism rests upon a general assumption or metaphysical principle applied to the special case of interaction between the reality of things and the thinking mind (§§ 325ff.). The result of action on the mind is invariably conditioned by the nature of mind itself, and only in the special forms in which that nature expresses itself can the result make its appearance.

Experience, therefore, must always exhibit an *a priori* side, and only in experience can the *a priori* truths, the formulations of what is the essence of the thinking mind in its contributory function, be discovered. The necessity and universality, the self-evidence, characterising these truths, cannot be exhibited as resulting from isolated psychological events; nor is it by the psychological method that insight into the peculiarity of knowing can be obtained.

Throughout these discussions there has been quietly growing in strength the doctrine that the formed product, knowledge, depending as it does on the peculiar nature of the thinking spirit, has a special mode of existence, and that its modes, though doubtless corresponding to elements in the reality of things, are not themselves to be taken as forms of the real. In the fourth chapter this doctrine receives explicit statement and ample illustration. The reality which appears in the formed content of thought is "wholly dissimilar to existence and can only consist in what we have called Validity or in being *predicable of* the Existent." Nay, even the content apprehended in knowledge has the peculiar timeless and changeless mode of being expressed in the Platonic Idea. It is indifferent both to the subjective movement of thought and to the changes of the empirically presented world of perception in which the real seems to be directly given. In this last clause is found the final problem for Lotze's view of thinking. How can we represent any relation between the world of thought-contents (about which we can make only one assertion as necessary for thought itself, viz., that each thought-content is itself and no other) and the changing stream of perceptive experience? Having brought the separations of knowledge to their ultimate form, how are we to understand the junction which appears to take

place? The answer which Lotze makes depends to a large extent on the manner in which the separations have been expressed, but it is fairly given in the three positions signalised by him. First, any assertion within the sphere of knowledge regarding real existence is hypothetical. Secondly, we must assume that the empirical, perceptive world has law in itself. Thirdly, we may obtain, by a scrutiny of perceptive experience itself, certain directly given synthetical truths, on the basis of which thought, discursively proceeding by its own formal rules, may confidently hope to erect a structure of knowledge that shall not only be consistent but in harmony with the laws of fact. On the first and second of these positions I offer no remark; they are simple statements in appearance, but in reality conceal a whole philosophy. The third is the most interesting, for it brings to the front the question which throughout the *Logic* has been in the background: To what extent has Lotze succeeded in justifying his restriction of the functions of thought to the discursive, mediating act of passing from premisses to conclusion?

On this limitation depends the worth of his separation between logical and metaphysical relations, and the validity of his general view of the logical forms. Thought has been placed in opposition to the real, as antithetical to, though corresponding in some way with, it; in the movement of thinking the apprehended content has inevitably found expression in the forms of concept, judgment, syllogism; yet these forms, it is insisted, are in no way relations of the real. Now we find Lotze introducing a new distinction, from which would follow a far more serious restriction of the function of thought, a much more limited notion of the significance of the logical forms. Dealing with knowledge, he reinstates the Kantian doc-

trine of synthetical *a priori* judgments, assigns these, however, in a thoroughly un-Kantian fashion to a perception which does not contain the element of thought, and regards them as self-evident, intuitively grasped data, from which the discursive, elaborative activity of thought may proceed in the construction of a knowledge that adequately represents the real. One would raise little or no objection to what is said regarding the self-evidence of these data, and the necessity in the long run of resting knowledge on self-evidencing judgments; there is here, doubtless, one of those fruitless problems of philosophy which owe their origin and interest to the enormous difficulties of stating simple facts. But one cannot avoid asking, What, then, in their nature, are these primitive data? Are they *judgments*, apprehensions of a connection in real fact, which by inherent light approve themselves as being connections in fact and not merely subjective modes of apprehending? Only the affirmative answer can be yielded by Lotze, though, as was said, he prefers to disguise the answer by using the term "perception." If then we insist that thought has only to deal in the fashion of elaboration with such formed products, we must recognise that, in so using the term "thought," we refer not to that which is responsible for the specifically logical forms of concept, judgment, and syllogism, but to the mode in which thinking as a phase of the concrete psychical life of the individual mind is carried out. We can no longer maintain that to thought are assignable the fundamental arrangements that make up the essence of concept or judgment; by thought can only be meant the special exercise of dealing with material already formed, in the modes which we have called the forms of judgment and concept. That there may be such a discursive exercise may pass without further question; the restriction of the

word "thought" to it has no justification, and it excludes us from regarding the logical forms as in any way expressing the essence of thought.

It is not from one portion only of Lotze's exposition that one would reach the same result. Looking back on his account of the procedure of thought, we find that he starts his survey of the logical activity with the presupposition that material for thought has already received a special handling, has already been formed into definite objects, with distinguishable and comparable marks; and, moreover, in the history of the logical activity, the somewhat vague notion of *ground* has been made to play a very remarkable part. For under its cover there have been quietly introduced into the contents of thought, of the concept, *e.g.*, the all-important features, aspects, of determining and determined, of essence and appearance, of law and modifying circumstance. If one asks,—What, then, are these aspects of the objective content conceived (apprehended in form of a concept)? Are they *thoughts?*—no explicit answer is given. Lotze has been consistent in holding that underneath the logical operation of thought, in the wider sense in which he used that term, there have always lain the metaphysical assumptions; but he has never fairly faced the question whether these are not in their essence thoughts. The difficulty of accommodating the logical activity to these ultimate determinations of objective reality becomes still greater when his narrower conception of thought, as a merely elaborative, mediating process, is to the front. For then one may fairly ask: If knowledge, the whole structure that is due to the operation of discursive thinking, be based on immediate data, which are in form judgments, but which cannot be exhausted by the one law of discursive thought; if the procedure of thought involve throughout

determinations that are not traceable to the activity by which notions, judgments, and syllogisms as modes of elaborating come about ; if, finally, the ideal which thought involves cannot be expressed as the reduction of experience to an analytical whole,—is it not entirely without justification to identify the discursive activity with thought? Are not the accompanying features of this discursive process the genuine characteristics that make up the essence of thought? and is not the discursive process itself but a phase of the concrete life of spirit, the analytical effort of understanding?

It is the opposition between the apparently timeless and changeless content of thought, and the changing, temporally modified content of perceived reality that weighs most with Lotze and causes him to distinguish so sharply Logic from Metaphysic ; yet without diminishing the opposition, one may well doubt the interpretation he has given of it and the conclusion he draws from it. Were one to allow to the fullest extent that the essential aspects of the real, those by which it is intelligible for us, are in their nature "thoughts," and that "thought" is but another name for the system of such thoughts, one would still recognise that, when thought is taken in abstraction from the concrete reality of thinking mind and external reality, it presents the timeless and changeless character of the Platonic Idea. But such result is due to the abstraction that has been made ; it is we who make the opposition, not the nature of things ; and the characteristic of the realm of ideas attaches to it not as an entity in itself, existing in isolation from the real, but as an *abstractum* with no independent, *factual existence*, not even existence of a kind different from that of the real. The world of thought *per se* is truly a "kingdom of shadows" when we compare it with the full reality of concrete existence, but not on this account should we

suppose that thought is somehow divorced from things and has but a formal function in their regard. The perplexities to which such a supposition leads take ample vengeance for the error of mistaking a distinction in thought for a distinction of thought from things.

The minor oppositions which prey upon Lotze seem to connect themselves with the same fundamental consideration. The life of the individual subject contains no perfect picture of the world of being; that there should be much in it which but imperfectly represents the real relations of things—that the human mind should pursue many a devious path and be liable to varied error—is hardly surprising; and one need not on that account suppose an original and impassable separation between reality and knowledge. The consideration of the ways in which our thinking attains to knowledge, of the methods by which crude imperfect experience is transformed, belongs to Psychology rather than to Logic. In sum, what Lotze has marked off as Logic seems to be no independent doctrine, but in part the fragment of a larger whole, the treatment of thought, which is Metaphysic, in part belonging to the history of the development of knowledge in the individual mind, which is Psychology. That Lotze uses Psychology in a narrower sense, that he tends to contrast the psychical mechanism with thought, may be regarded as an expression of the deep-seated disinclination he throughout manifested to contemplate a constructive, systematic philosophy. Justification for the view can be found only in his final metaphysical conception, which, at all events in large part, is accessible in the *Metaphysic*. In a subsequent notice of that work, I propose to consider farther the bearings of his general philosophical position on his treatment of Logic.

III

LOTZE'S METAPHYSIC [1]

In the *Metaphysic* Lotze sums up, with ample historical and critical detail, views which in many other forms he had already laid before the world. If, however, it is to be said that the work contains little absolutely new to the readers of his earlier philosophic productions, it is to be added that only in it is there given the fulness of statement required to make a speculative thought intelligible, and that in this, his latest effort, Lotze's remarkable powers of subtle expression, wide knowledge of the manifold issues raised at every step in speculative construction, and keen sense of the bearings of metaphysical thought on real experience find their amplest scope and bear their richest fruit. No word need be said of the value of the *Metaphysic* as mere discipline. Instructive as Lotze's method always is, whatsoever be the matter to which it is applied, it is here more than ever of significance. The work is a monument of careful, profound, and comprehensive thinking. But it is sufficiently recognised that in Lotze, Germany and the world have lost the last representative of a great philosophical tradition, and that his works must be taken to heart by any student who desires to know how

[1] *Mind*, October 1885.—A critical notice of the English translation of Lotze's *Metaphysic* (Oxford, 1884).

the problems of speculation still connect themselves with the ever increasing mass of special knowledge that the labours of the new generation have accumulated. Our business, at present, is solely with the one closely knit view of things that forms Lotze's metaphysical conception, a view that has given connectedness to his researches in many special fields, that has grown with his growth, and that finds here its most explicit statement.

"Except in rare cases," Lotze has said,[1] "a prolonged philosophical labour is nothing else but the attempt to justify, scientifically, a fundamental view of things which has been adopted in early life." There is certainly a wide difference, in form and in detail of treatment, between the *Metaphysik* of 1879 and the early, little appreciated work with the same title of the year 1841; yet the slightest comparison of their contents enables us to see that the fundamental conception has remained the same, and that the difference arises, in part, from a relinquishment of the method which in the earlier work exhibits clear traces of the then prevailing philosophy in Germany, in part, from the increased fulness of special experience with which the fundamental thought is connected. In both the fundamental conception is that of ethical or teleological idealism —the view of the sum total of things as the unfolding of a plan, of which the significance is spiritual, of which the fixed traits are the general laws of order and connection in nature, and of which the manifestation is the varied realm of things.

The manner in which a thinker arrives at his deepest conviction or is led to give definite form to his thought has always more than mere personal interest. The influences which have weighed with him, and which enter as com-

[1] *Contemporary Review*, January 1880, p. 137.

ponents into his view of things, are not to be regarded as mere external accidents; they form the very substance and in some ways the most significant element of his views. The function of a metaphysical doctrine is to give a unity to experience, and the character of the experience taken in is an essential constituent of the doctrine itself. Lotze has not left to conjecture the task of determining what in his case were the historic circumstances under which his thought was developed. In the interesting account of his early speculative impulses given in the *Streitschriften* (1857), he permits to be seen with the utmost clearness the two great forces which operated on him. These were, briefly, the idealist philosophy of which Hegelianism was the prominent representative, and positive natural science then beginning its extraordinary development in Germany. The opposition between science and the application which Hegelianism had made of idealist philosophy to the details of real experience was in Lotze's mind decisive as to the need of reconstructing, or stating what seemed to him of permanent value in, the great speculative thought of idealism. One may think that he was never quite just to the method of Hegel, that he failed to distinguish what was extraneous to it from its essence, and that his keen sense of the dangers which it had not avoided occasionally carried him too far in the other direction; but it must always be admitted that he undertook the recasting of the idealist conception with an infinitely fuller knowledge than his predecessor of the real experience to which it must be applied, and consequently was enabled to enrich and expand the thought with which at heart he was in entire agreement. It may perhaps prove that the chief value of the *Metaphysic* will consist in its service as introduction, from the more modern point of view, to the bolder, more comprehensive

idealism of Hegel. Some perception of this was doubtless operative in inducing the late Prof. Green to devote so large a portion of his industry to the translation of the present work. Quite a third of the volume is due to him.

To Lotze himself, as one may gather from many detached criticisms and from the general tenour of his whole treatment, there appeared to be one vast difference between his own conception and that of Hegelianism, a difference extending beyond and lying at the root of the manifest divergence of method. In laying out the matter of metaphysic, Lotze adopts on the whole the method of Herbart, and generally is of opinion "that it is only inquiries conducted in the spirit of realism that will satisfy the wishes of idealism." But the superficial difference of arrangement only indicates the deeper opposition in which Lotze stands to the Hegelian method. To him that method seemed to imply the view that the ultimate nature of reality was to be found in and was exhausted by a symmetrical interconnected system of thought-determinations, from which in some way the real proceeded, of which the real was in some way the imperfect manifestation or shadow. Even though at times he is forward to acknowledge that in Hegel are found correctives of such a view, he is yet consistently of opinion that the Hegelian method leads to nothing but a rehabilitation of the Platonic impassable and unworkable division between the realm of absolute thought and the changing, variable, transitory, and relatively non-beënt world of finite fact. To such a conception he stands in irreconcilable opposition and would press as against it the view that found in Aristotle its early exponent. With a statement of the opposition the *Logic* closed, with a restatement of it the *Metaphysic* opens.

It is not, says Lotze, consideration of the pure relations which hold good of the contents of thought that can force on us the metaphysical problem. For of these relations it cannot be said that they are, that they exist, but only that they hold good. Change is predicable of them, only by metaphor. In the world of the thinkable, condition passes not into conditioned, but remains valid with it in eternal, timeless quiescence. The characteristic of the real, its constant change, is no content that can be constructed by thought. Being and non-Being, as thought-contents, stand for ever side by side, each identical with itself and, for thought, irreconcilable with the other. Only an experience that is not pure logical thought brings before us as living fact the changing play of real existence; only in experience that is more than, other than thought, do thought-relations obtain realisation.

"The true reality includes as an inseparable part of itself this varying flow of phenomena in space and time, this course of things that happens. This ceaselessly advancing melody of event—it and nothing else—is the metaphysical place in which the connectedness of the world of Ideas, the multiplicity of its harmonious relations, not only is found by us but alone has its reality." [1]

It would certainly be impossible to exhaust in a single statement the implications of this strongly marked antithesis; only from a connected view of the consequences flowing from it, can one hope to arrive at adequate insight into its significance and worth; and to the exposition of such a view the *Metaphysic* as a whole is devoted. Before turning to the main line of speculation, we may consider for a moment certain preliminary doctrines which concern mainly the method to be pursued, but which likewise

[1] P. 73; *cf.* pp. 78, 84, 135.

connect Lotze's speculation in an intimate fashion with one at least of his predecessors in German philosophy.

It is an opinion which Lotze has repeatedly pressed, nowhere with more explicit statement than in the introduction to the present work, that metaphysic has no absolute method and must be content to start with any given problem of experience in the hope that systematic effort to clear up all the involved difficulties will find satisfaction only in a connected view of all the assumptions that for our thinking render the real conceivable. Assuredly, if by a special method were to be understood something lying outside the body of metaphysical thought itself, by application of which the course of procedure should be from the outset determined, no hesitation could be entertained in accepting his position. Thought has certainly no external standard to appeal to for aid in directing its procedure, nor any external means of testing the progress it has made. Itself is its own light. Even less doubt could be entertained as to the truth of the opinion, and still less value would that opinion have, if it were interpreted as meaning that the ways in which subjective thought gradually attains insight into those assumptions which it must make in order to give consistency and clearness to the conception of real existence, are as various as individual thinkers and occasions of reflection. The movements of the individual's thought assuredly prescribe no laws to the real about which his thought is exercised, and need correspond in no way to those connections at which he ultimately arrives as expressing what he is convinced must be thought, if reality is to have for him consistency. But to maintain that the "forms of apprehending true Being without which we cannot think"[1] are interconnected; that in all its notions

[1] *Metaphysic*, 156.

mind is depicting only the universal features of its own nature,[1]—is, while perfectly compatible with the view that "philosophy is throughout merely an inner movement of the human spirit," [2] to grant all that could be demanded by the most ardent defender of a method peculiar to speculation. Doubtless, it is certain side-thoughts that give colour to Lotze's definite expression of opinion. He has in view pre-eminently the Hegelian dialectical method which appeared to impose on speculative thought one line of progress and which seemed to claim for thought itself possibilities of advance that, as Lotze thinks, can only be furnished by the special problems suggested in variable experience. But here, as throughout the *Logic*, Lotze seems to be entangled in the ambiguities arising from the double sense in which the term Thought is used by him. Thought is, on the one hand, the formal process finding expression in logical relations; on the other hand, it has the fulness of content that attaches to it as systematic representation of the assumptions necessarily made in regard to real existence. In the first sense, thought has certainly no power of self-development; in the second sense, a needless opposition is instituted between real experience and thought,—an opposition that Lotze has ample occasion to withdraw. The developed conception of the nature of real experience must contain an explanation of the remarkable union in thought of the apparently irreconcilable difference between the objective content and the subjective existence of thinking as in the individual spirit. It is the peculiar excellence of Lotze's view that it allows us to put those different sides in a harmonious relation to one another; but such a result is altogether incompatible with the strong antagonism manifested to the methodical prin-

[1] *Mikrokosmus*, iii. 539. [2] *Metaphysic*, 165.

ciple that in thought itself lies the spring of its own movement.

In one minor contention, Lotze finds himself in agreement with the view he otherwise opposes. Metaphysic cannot rest on or be preceded by a Theory of Knowledge. A criticism of knowledge is possible only on the basis of an underlying Metaphysic. In words at least, this opinion seems to stand in "unheard-of opposition to the tendency of our time." There may be thinkers who have understood the Kantian idea of theory of knowledge to be equivalent to "a psychological analysis of cognition," and who have deemed it possible to analyse knowledge in general on the basis of some hastily assumed psychological facts. Doubtless, too, the demand to consider how knowledge is possible before proceeding with satisfaction to concrete problems, may readily degenerate into an empty formula, worth little more than the old request to determine the eating powers of a chimæra *in vacuo*. Doubtless, finally, it becomes a weariness to have critics of the Critical Philosophy continually charged with misapprehensions of its genuine meaning. But it seems, nevertheless, worth while to say that from Lotze's reproach Kant himself must be taken as exempt. With all its appearance of psychological method, the "Transcendental Logic" has no other problem than that set by Lotze to Metaphysic, to determine the significance and connection of the propositions in regard to reality which "we believe ourselves to have no option but to maintain." The categories and other "playthings of philosophy" are not for Kant mere forms of subjective thinking; and that they should be put in most intimate relation to knowledge as constituting its essential structure is but to say that the connection of the real is only for mind. To examine the possibility of knowledge is not for Kant to give a psycho-

logical analysis of the constituents of knowing or a history of how it comes about, but to determine the ultimate meaning of the notions, propositions, or assumptions which are involved in the simple fact of experience. And, on the whole, whatever opinion may be formed of the limitations inherent in the Kantian method, one would be inclined to say, regarding the character of much post-Kantian metaphysic, that there is still need of Kant's strenuous warning that the significance of the ultimate forms of intelligibility can only be determined by viewing them in relation to thought. We may trace even in Lotze, though in him the due corrective is not wanting, a tendency towards treatment that closely resembles the pre-Critical method of Leibniz; and, in all historical reference to Kant, it should be borne in mind that the pre-Critical method was not foreign to him, that, *e.g.*, the conception of interaction as implying change of inner state among the individual members of a system was a point from which Kant started, not a new idea of scope wider than the limits of the Critical method.[1]

It is probable that to the influence of Herbart is to be ascribed Lotze's tendency to treat the Kantian and Hegelian method as inevitably falling into subjective idealism; for subjective idealism is the enemy against which Herbart directs his strongest attacks and has most sedulously to defend his own position. Lotze is certainly no Herbartian, and is right in declaring that, on the points on which his views approximate to those of his more immediate predecessor, both drew from a common source, namely, Leibniz;

[1] It is of interest to compare Kant's first metaphysical handling of the problem of real relations, in the *Principiorum prim. cognitionis metaph. nova Dilucidatio* (1755), with that of Lotze, *Metaphysic*, bk. i, cc. 4, 5.

but in the external form of his method he imitates Herbart, and throughout the *Metaphysic* the conceptions which he bears most constantly in mind are those of Herbart. Nor is this unnatural; for Herbart's metaphysic has a prevailing air of scientific realism. Herbart's treatment of such fundamental conceptions as those of change, substance, and cause comes near to the exacter determination of ordinary thought that characterises the best scientific method, and in some departments at least, as in psychology, the results are of the most excellent kind. It is possible at the same time—and for the view one would claim the support of Lotze—that the best results of the Herbartian treatment in the concrete spheres of research are independent of the peculiarities of the Herbartian metaphysic and can be combined with a conception of the whole nature of reality differing widely from that of Herbart.

The treatment of the first fundamental notions of Ontology—being, quality, reality, and change (Book I, cc. 1-4)—is directed so consistently against Herbart's doctrines that some notice of the latter seems needful in order to seize the full meaning of the result to which Lotze slowly works up. To Herbart, the task of Ontology was the elaboration or clearing up of the notions involved in or connected with the indirect affirmation of real being given in sense-perception. Philosophy, in his view, has to start from a foundation supplied to it, has to accept something as given, and has then to endeavour so to determine the nature of the involved thoughts as to bring them into conformity with the absolutely valid laws of our thinking—the laws of identity and non-contradiction. Experience in its simplest phase, sensuous perception, no doubt offers us much that is incoherent, self-contradictory, and standing in need of elaboration; but of one lesson it

teaches there can be no doubt: it teaches that something is. Even if all the content of experience be characterised as phenomenal, even if we admit that sensuous perception as qualitative state of a percipient can in no way be identified with the quality—the *what*—of the real corresponding to it, yet the fact of perception, the order and method of perceived content—order and method which are as much given as the content ordered—force upon us the thought of an independent real from which they follow. The course of philosophy is thus arc-like: it starts from the groundwork of experience, is driven onwards and upwards to the conception of a reality that is not in experience, and has to descend again in explanation of experience with the wealth of notions that it has gathered in its progress. But the course of thought is never other than subjective. The contradictions inherent in the crude notions of experience drive us to supplement these notions and to form more complicated conceptions which allow thought without self-contradiction to deal with experience; but the supplementing remains a work of thought merely and indicates nothing in the nature of the real itself. The related elements of a complex conception, the ways in which we consider now this, now that, aspect of the real, remain external to the real itself. Objective we may call them, if we understand by that only—valid for all finite intelligences to whom experience comes as a compound effect of the relations in which intelligence, itself a real, stands to other realities; but they are subjective in the deeper sense, that in themselves they express only movements of thought, *i.e.*, transitory states of a subject over against and inclusive of whom the realm of reality stands in unchanged, stable, motionless self-identity.

The motives which animate a great thought are always

so numerous, and the value which one assigns to it depends so much on its applicability to special problems, that a brief statement can convey but little of its deepest significance. It must suffice here to draw attention to the main outlines of the conception which Herbart, following the older Eleatic and Atomist thinkers, placed in opposition to the dominant philosophy of his time. For him as for the Eleatics, the real was characterised by changelessness of being, simplicity, and permanence ; but with the Atomists, he admitted multiplicity of being. The real he found in the absolutely simple, positive, specifically qualified essences, to the notion of which he thought we were driven in order to make consistent our empirical conceptions. The real existence which seems to be given in sense-perception, the more complicated experiences of things with qualities, of change, of interaction, seemed to him conceivable, if viewed as resulting from, or expressing, certain relations of the ultimate realities that lie beyond experience. That the real is, we affirm as a necessary supplement to experience ; what the real is, we do not know by direct perception, but we are driven to conceive of such real after the fashion of a simple quality, such as might be given in presentation. Having so determined the real, we have then to discover how, in conformity with its notion, to explain the most general conceptions of experience. the forms of our empirical knowledge, *i.e.*, Space, Matter, Movement, and Time, and finally Experience itself, as a series of states in a subject, which yet claims to have a peculiar relation with the real.

Apart from its general speculative importance, Herbart's view derives much of its interest from the apparent correspondence it maintains with the popular, common-sense, everyday conception of things. It represents one line along which thought, starting from the ordinary practical

mode of regarding the world, is compelled to proceed. We naturally and easily take as initial position the practical conception of ourselves as real, existent subjects, variously affected in consequence of the varying relations in which we stand to other real existences. The *position* or affirmation of reality in any presented content, offers itself naturally as the correlative of self-position, conviction of our own real being. An easy reflection, which doubtless conceals under its simple guise a highly complicated movement of thought, leads us to admit that the nature, the characteristic features of the posited real, cannot be identical with the qualitative content of the experience with which the *position* is connected; but we are just as ready to maintain that nevertheless the *fact* of our experience, the occurring of any presented content, is sufficient warrant for the position in question. We readily allow that the apparent unity of the things, to the conception of which we have accustomed ourselves, need not be absolute; scientific analysis renders familiar the view of apparently simple but really complex effects arising from the combination of simple antecedents; and, still carrying with us our conviction of reality as the substratum, we are willing to regard the varied field of experience as phenomenal result of unknown and unknowable real elements. Our realism easily transfigures itself. And equally simple reflections enable our first conception of things to yield certain provisional characteristics of these real elements. The difference between the fulness of direct sensuous perception and the unfulfilled content of a wish or purpose would be sufficient of itself, were it not confirmed by many similar distinctions, to lead us to the important discrimination between subjective and objective reality and to determine the latter as relatively independent, permanent,

self-existent. Now of these and like reflections the metaphysic of Herbart contains the precise and explicit formulation. Like them, it starts from the conviction of the real nature of the affected subject; admits that the qualitative content of affections must be viewed as dependent on the subject; maintains, however, that the fact of the occurrence of these affections, and the independent ways in which they come and go, are sufficient to justify the retention of our first, primitive belief in reality; and endeavours to give an exact formulation of the results to which reflection on the form of experience must lead. One might ask, with regard to it, whether these results do follow as supposed; or one might ask whether the results themselves satisfy the demands of thought from which they are assumed to have followed. The latter is the line of inquiry followed by Lotze, and, although something may be lost by adopting it to the exclusion of the other, we may here consider the substance of the criticism he offers.

Does the conception of the existent as made up of a multiplicity of ultimate reals, each characterised by the marks of positive quality, simplicity, independence, enable us to understand the world of experience? Does not the attempt to make this conception conform to the demands of thought itself lead, even in Herbart's hands, to such a transformation of it as practically to destroy its peculiar features? One might say here that the Herbartian conception of the real corresponds point for point to his conception of the mental life, and most of the difficulties of the one are the difficulties of the other. There the varied flow of inner experience is viewed as the continuously altering result of the mutual interference of the several isolated *Vorstellungen*, each of which *is* and remains permanently what it is. But it was impossible for Herbart

to avoid just such an alteration of his psychological doctrine as appears to be called for in regard of the metaphysic,—an alteration, as one might briefly express it, from the mechanical conception of a multiplicity of isolated units to the conception of a real altering spiritual life.

Consider, in the first place, the bare demands made in the notion of Being. Sensuous experience may appear to involve the positing, the affirming of a single, isolated, unit of reality; but it does so only if we allow ourselves to make a wholly false abstraction in its regard. The sensuous experience which might be conceived to have as its correlate the posited unit of reality would not be sense-perception as an act of knowing, but an abstract idea of the hypothetical simplest element in the psychical life. Nowhere do we find a sensuous experience which involves the position of an unrelated, absolute, real. The common-sense view of things goes no further than to the assertion that reality somehow *is* and is made known to us through sense-experience, nor does it ever involve the thought of real being as consisting in the absolute unrelated position of real elements. What determines for any element of existence its being is the relations in which it stands. The thought of pure being is, if we look to its genesis, an abstraction; if we look to its content, a mere abstract. Nor does it avail to insist that relations imply related parts, the being of which must therefore be allowed as independent of the relations. Common-sense here is in complete accord with speculative thought. Being is a connected system of which the parts taken in isolation *are* not. And if we allow ourselves to revel in abstractions, to hypostatise, as Herbart does, unconsciously perhaps but not unfrequently, and to speak of these isolated elements as existences which *enter into* relations with one another, we suffer the fate

inevitable on all abstract procedure: we are presented with incompatible features, with a disjunction that is to be united but refuses all combination. The relatedness of being is not an internal accident of being itself; elements which have not relatedness in themselves cannot enter into relations in general.

Herbart, however, had the courage of his opinions. He insisted that relatedness is an external accident of the reals, that the world of true being remains for ever intact, unaffected by change, and that the ground of change, phenomenal change, is not to be sought in any mark of the real itself. But careful analysis of his procedure makes clear to us that an important modification is introduced, and necessarily introduced, into the conception of the real. Phenomenal change we accept as an experience, which, though offering insuperable difficulties to thought, is nevertheless given; and the notions involved in it must somehow be capable of explanation. Herbart's explanation appears at first sight to be merely the more exact interpretation, the translation into metaphysical terms, of the criticism which scientific analysis of the common-sense view easily yields. One readily allows that the phenomenal thing, the complex of attributes united in our apprehension as one thing, exists not as it is at first conceived; that the multiplicity of attributes points to a multiplicity of real antecedents; and that the unity indicates no featureless substance, but merely the identity of one and the same real in varied relations with others. Any given real, A, may be placed in relation to any number of other reals; out of each such relation will emerge, for a spectator who is not directly cognisant of the reals but himself stands in relations, the apprehension that we call a quality or attribute; and popular thought readily accommodates itself

to the admission that the unity of the empirical complex is provisional. Change, in like manner, must be interpreted as the phenomenal indication of the coming and going of real relations. But, having gone so far with Herbart, one is compelled to ask, not only whether more has been done than to express in a vivid way the primary conviction that experience rests upon reality, but whether the new interpretation is compatible with the metaphysical conception of the nature of the real. If the real is to be conceived as a multiplicity of simple unchangeable elements, capable of entering into relations with one another, what, for the reals themselves, is the significance of these relations? It is in vain that Herbart endeavours to retain the two opposing sides of his doctrine. He cannot at once claim for the real elements their characteristic features of unchanging self-identity and find in their varying relations the ground of phenomenal change, substantiality and causality. Even if it be granted that, for a subject that stands as one real among others, varying relations will take form, will find schematic representation in the ways familiar to perceptive experience as alteration, determined sequence of states and of events,—it remains impossible to interpret the nature of these real relations in conformity with the Eleatic view of Being. Herbart himself has another mode of interpretation. Change is not in any one real; but it may follow from the reciprocal relations of the reals. For these, he thinks, may be legitimately viewed as opposing one another, and as preserving each its own identical being in the midst of opposition. Each real maintains itself against disturbance or suppression from other reals, and in this self-maintenance is to be found the secret of real action. In any one real there may thus be a series of states or conditions, expressing the ways in which it preserves itself over against the other

reals that oppose themselves to it. The elaborate criticism which Lotze offers of this new conception leads directly to the heart of his own view, and it may be briefly summed up as follows. If we preserve our first conceptions of the reals as simple, self-identical posited contents, then opposition or any kind of relation between the reals can only be thought as subjective mode of relating on the part of a conceiving mind, from which there follows no explanation at all of real action. If we desire to explain real action, and so allow that relation of the reals is more than subjective result of comparison—is something in the real world itself—then we must resign our conception of the world of reals as a multiplicity of independent, distinct, self-identical units. It is not that we require to supplement in any way our conception of real action in order to attain this result; we simply require to make plain to ourselves the implication of the thought. He who posits real relatedness must at the same time allow that the independence of the related elements ceases, that they become no longer changeless, permanent centres of relation, but merely the relatively fixed points in one continuously altering system. The unity and self-identity which we demand of the real must be transferred from the hypothetical monads to the whole in which they are members.

Of the substantial soundness of Lotze's criticism no reasonable doubt can be entertained. The same line of thought, though with differing form of expression, lies implicit in Kant and in Hegel. For Kant is practically expressing the same view when he insists that, so long as we attempt to conceive objects as merely logical units, interconnection of them is impossible. Objective relation is only possible in an experience connected together in the unity of a thinking subject. The very gist of Hegel's

philosophy lies in the antithesis to Herbart's conception of the real nature of things as an aggregate of simple, unchanging points of relation. Lotze has his own quarrel with both Kant and Hegel, but it is animated by quite special considerations and is of small importance as compared with his agreement with them on this cardinal point.[1]

That the real cannot be conceived after the fashion of perceived object, but only in the systematic order peculiar to the content of a notion, is a conclusion from which one may rapidly proceed to a statement of Lotze's ultimate metaphysical view. Retaining as he does the opposition between our subjective thinking and reality, Lotze is careful to maintain that the various thoughts by which we gradually correct our first conception of things are not to be taken as themselves constituting the nature of reality, but as the ways in which we construct for ourselves a view that satisfies the problems reflection brings before us. The being of things we cannot reconstruct; we must accept the given fact of existence, and resign the inherently hopeless task of accounting for the fact that anything exists. But since we have seen that the ultimate nature of things is not to be sought in an aggregate of simple qualities, that the *position* characteristic of things is not to be taken as distinct from their content, that change and relatedness belong to the very essence of reality,—we are driven to conclude that the being of things is not a doom thrust upon them from without, is not the result of a union between qualities and an underlying substratum of reality, is not a law external to the cases of its manifestation, but

[1] One of the briefest statements of Lotze on the problem of the nature of real relatedness will be found in the *Grundzüge der Religionsphilosophie*, §§ 14 ff.

can be interpreted only as the ability to act and suffer, only as the position which the so-called thing occupies in a systematic whole of interconnected and mutually determining reality. And, if we push further our attempt to make clear the notion of this interconnected system, we are forced to the conclusion that the absolute independence of things is an erroneous exaggeration of a truth correct enough in its proper place, and that relatedness of things is conceivable only if the so-called things be viewed as members of one fundamental unit or substance, or Absolute.

Philosophy has sought out many forms of expression for the notion to which Lotze, by his own path, thus attains; and, on the whole, criticism of them does but force upon one the extraordinary difficulties which attend any attempt to sum up in one brief formula the content of the most complex thought with which we interpret experience. It is hardly possible to avoid the abstractness attaching to the employment of any one notion as explanatory of a wide and varied complex of facts, and frequent injustice must be done in the criticism of other solutions by overlooking the inevitable narrowness of the notions through which definite formulation of a view has been sought.

It is by closer scrutiny of the conception of real interaction among so-called things that Lotze advances to a more complete determination of the characteristics necessarily involved in the thought of the all-embracing reality. If relations obtain among things, if the thought of reciprocal determination is to be taken as more than a subjective term of comparison, these relations cannot remain external to the things themselves, but must indicate changes, reciprocally determining, in the inner states, the modes of existing, of the things themselves. That this should be so, is but a special application of the thought which Lotze throughout

insists upon, the thought of reality as no mechanical compound of matter and form, but as itself the living, developing whole. If, further — recalling the conclusion reached, that the independence of things is but an abstraction of our own thinking, and that the possibility of a reciprocal determination of inner states exists in the unity of the real in which all such states are—we ask what mode of existence we can ascribe to the absolute real attained, we have simply to consider what insight we possess into the possibility of a union, a real union, of manifold states in one being. With Leibniz, Lotze answers, there is given one, and there is only given one, instance of such *unitas in varietate:* spirit or mind. We can only conceive of the absolute, the uniting bond of the varied states of so-called things, after the fashion of spirit or mind. Reality, in the full sense, is only for the unit conscious of its own unity in multiplicity. Doubtless such a conclusion raises many special problems, but it furnishes the sole comprehensive answer to those more abstract inquiries that fall within the scope of Ontology.

It is not possible to do more than indicate in the briefest fashion the nature of the discussions which fall under the remaining rubrics of the *Metaphysic*. Generally, the purport of these may be said to be the attempt to show that the forms of experience, more or less complex, which at first glance appear more particularly to connect themselves with the realist view of the universe, are susceptible of as exact and more profound interpretation on the idealist hypothesis. For example, the reality of space, which is a necessity for the realist view in one fashion or another, whether in the crude fashion of naturalist speculation or in the finer metaphysic of Herbart, may retain all its significance when interpreted as signifying merely that in the

nature of the inter-related activities of so-called things are involved features which are capable of apprehension by us only in the fashion of the space-schema. Space is thus a mode of intuition, or rather a mode of the intuited: for its relations appear in the content of the apprehension, not in the mode of apprehending. Time, in like manner, must be conceived not as something external to the real life of the one absolute being, but as the mode in which, in the experience of the finite spirit, the orderly connection and continuous development of reality is apprehended. There is in the chapter of Time, and in the treatment of the same point in the *Grundzüge der Metaphysik* and *Grundzüge der Religionsphilosophie*, much matter that would deserve careful and detailed handling. Of special interest, in my opinion, is the manner in which Lotze has to connect with the metaphysical difficulties of the notion of Time the psychological problems that arise from consideration of memory and of the limit of simultaneous consciousness.

The further the Cosmological speculations are pushed, the more nearly do they approach a question familiar to British philosophy. When space has been interpreted as a mode of intuition, when a reading in terms of conscious experience has been attempted in regard to the fundamental characteristics of matter, when the independent existence of so-called things has been denied,—the question naturally arises, Are things and their relations more than the orderly experience of finite minds? Is there no existence in the universe of reality save the conscious experience of minds? Unfortunately the answer to such a question has too often been attempted with the aid of notions altogether inadequate to it, and with an almost total forgetfulness of the true metaphysical significance of the question. One cannot but feel sympathy with Herbart in his indignation at subjective

idealism ; for if ever there was an empty formula, parading itself as full of meaning and value, it is the fancied philosophical truth that since all that we know is in self-conscious experience, our varied presentations and representations compose the total of reality.

It is a prejudice, though an inveterate prejudice, that the spiritual, inner life has no other function than to reflect in fashion of a mirror a real world, complete in existence and function independently of mind. The contrast that obtains under any metaphysical conception between the larger life of the whole and the inner modes of being and acting which make up the individual's self-consciousness, is too readily interpreted as a contrast between two radically unlike phases of being ; and the simple truth that the being of even the hypothetically assumed *thing* is not identical with the phase of individual thought in which it is directly apprehended or indirectly represented, is taken to mean that the being of things is complete and absolute apart from the spiritual realm of self-conscious mind, that existence breaks up into two unlike spheres. But we rob the thing in no way of its *reality* for all the practical ends of life (and these for the most part determine our conception of reality) when, on purely ontological grounds, we deny to it self-existence and independence, and interpret it as but a form of the process through which the absolute, itself spiritual in nature, takes expression. Just as little need we hesitate to say, on grounds more psychological, that things are not in the fulness of their being save when forming, with and in relation to the inner life of self-conscious minds, parts of that to which we can assign reality of existence. Things are not modes of apprehension of finite minds ; the external world is no spectral illusion or projection of individual minds ; but the existence of things, of an external world, is

not a summed up, completed fact, apart from the existence and thought of finite minds. We must interpret the world as one whole, not as an incoherent juxtaposition of opposed parts. A world in which there is an inner life, directly and immediately given, cannot be interpreted after the realist fashion, whether in its crude or more refined form. And here, one may be permitted to say, lies the oversight in the quasi-metaphysical schemes that have been based on modern scientific conceptions. We need not only the most exact and complete history of the ways in which the real course of things has proceeded, but to interpret the whole in the light, not of what is lowest, least independent in it, but of what is highest, most complete in being.

It is but a step from this conclusion to a new series of thoughts which Lotze, wrongly one may think, does not specifically include under Metaphysic. In accordance with his stubborn antagonism to the term Thought, Lotze, insisting that the function of thought is but formal, finds in the concrete life of spiritual activity, as contrasted with the cold, colourless mechanism of thought, the vehicle through which the real existence of things is brought down to us. It is Experience in the largest sense of that vague term—real apprehension, feeling, and acting—that gives us a place among things and indeed makes these things to be for us. And in this concrete life, there are features, feelings and estimates of worth, of which the pure contemplation of the world by thought could give us no inkling, but which force upon us a new and larger interpretation of the sum total of things. In fact, Lotze arrives by his own path at the point long before reached by Kant in the *Kritik der Urtheilskraft*, and like Kant, though with more modern phraseology, offers a final reading of the universe in terms of ethical idealism. Things are, not

merely in order to be the parts of a mechanism, but as the instruments whereby the ultimate good is wrought out; our knowledge has objective value because it brings before us no mere purposeless play of phenomena, but gives us a world the interconnections of which are subordinated to the final and sole reality in it, the Good. Of the manner in which Lotze handles the difficult problems raised by these thoughts, nothing need here be said, for Lotze has himself with his usual caution excluded the treatment from Metaphysic proper. The ninth book of the *Mikrokosmus* and the *Grundzüge der Religionsphilosophie* contain his most matured expressions.

A notice like the present can convey but a very imperfect idea of so complicated a work as the *Metaphysic*. There exists in the English language no other work at all resembling it, and one may hope for good results from its appearance among us. Very sincere gratitude is due to the translators, who seem to have executed their difficult task with the most conscientious care and with a high measure of success. Our stubborn tongue does not lend itself readily to the expression of subtle thoughts, and at times the sentences of the translation have a Teutonic awkwardness, but on the whole the book appears to me by far the most successful of the unfortunately few translations we possess of German philosophical works. The editor, Mr Bosanquet, is to be congratulated on the successful termination of what must have been difficult and delicate work.

IV

MR BRADLEY'S LOGIC[1]

MR BRADLEY'S work comes very opportunely. It is a characteristic feature of much of the best philosophical work of the present time that it consists in the main of revision of fundamental principles. A period of eminently constructive work lies behind us, and it is not impossible that much of the present stir may signify only the process of coming to understand what has been done. But it is true now, as at all times, that a philosophic view is only to be attained from one's own position, and that a comprehensive philosophic method can only become living and fruitful if it connects itself and is penetrated with the thoughts of the present. There is no simple tradition in philosophy, and, if a method or system is accepted, the ground must lie in the fact that its leading idea has proved itself capable of expanding so as to cover the new aspects under which the perennial problems have appeared.

It is but natural that the process of scrutinising first principles and testing them by application to the great body of questions that has always formed the material of philosophy should appear, when regarded from a somewhat external point of view, like a chaos of disjointed and

[1] *Mind*, January 1884.—A critical notice of *The Principles of Logic*, by F. H. Bradley (London, 1883).

mutually opposing tendencies. Certainly the present state of the study of Logic has this appearance. If one takes only the representative English writings in that department, one cannot but be struck by the apparently boundless diversity of view in regard to every matter of fundamental importance. Province and method of the science, auxiliary principles with which to make the approach to logical doctrines, theory of the doctrines themselves—in no one of these points is there anything like an established view, a common basis. It is not many years since one might have said that, on the whole, putting aside the merely historical teaching of what is erroneously entitled the Aristotelian logic, English writing on the subject might have been fairly distributed under two main heads : on the one hand, a purely formal logic, basing itself, though perhaps unwittingly, on an extremely imperfect psychology, supporting itself by appeal to the high authority of Kant, and claiming to have effected, if at a cost of rejecting the most interesting questions, a purification and scientific limitation of the sphere of logical discussions ; on the other hand, a general theory of knowledge, likewise involving much disputable psychology, but rightly claiming to represent more truthfully than its rival the actual process of thought as exemplified in scientific work, and so extending its boundaries as to be able only by arbitrary refusal to reject the deeper questions inevitably raised by any discussion of the nature of knowledge. In a multiplicity of ways, complete dissolution of the one, and partial dissolution of the other of these apparently compact doctrines has been brought about, and now the state of Logic is like that of Israel under the Judges : every man doeth that which is right in his own eyes. Even when a writer is aware that fundamental difficulties lie in the way of the view upon which he is

proceeding, he claims the right to act as did the prudent divine, to look the difficulty in the face and pass on. The reader is perplexed by continual references to a distinction between logical and non-logical, a very phantom on which he can lay no hold, but which in some strange fashion appears to regulate his author's proceedings and to extricate him when any formidable danger is at hand. Each *Logic* presents some new arrangement of material, some fresh classification of notions, judgments, and the like, some novel way of getting over an old familiar stile, but it is rare indeed that in any such treatment a really vigorous effort is made to show the grounds for all that is advanced and so allow the reader to form what our German friends call an objective opinion.

Affairs are no better, perhaps to some they may appear worse, among the German logicians. In that speculative domain, *Logics* swarm as bees in spring-time. Many of them, it is true, do not aspire to more than merely academic honours; they are text-books from which the reader may learn a little, and by which he may to some extent be disciplined in thinking. But, these apart, there have been supplied by German writers within the last few years quite half a dozen treatises of a much higher order, comprehensive, elaborate, based on principles of some sort, and each giving an altogether individual and new reading of the fundamental logical processes. He who endeavours to extract from the *Logics* of Lotze, Sigwart, Bergmann, Schuppe—even if he does not extend consideration to the somewhat earlier but yet living works of Ulrici, Trendelenburg, and Ueberweg—a systematic representation of logical doctrines, has before him a task to which the labours of Hercules were simple. He will doubtless be able to discover that in some fashion all are treating of the same fact, whether it

be described as thought or knowledge ; more of agreement than this he will hardly find. In the mass and in detail, each treatment pursues its own way, and supports itself by a more or less explicit reference to something else, whether psychology, or metaphysics, or common-sense, or philology, or anthropology, or what not. Classifications and distinctions are introduced, on grounds sufficient or insufficent but invariably diverse, and thus, in so cardinal a matter as the distribution of the forms of judgment, we are presented not only with such rearrangement of the comparatively familiar types as indicates a novel point of view, but with a variety of new forms, substantial and accidental, descriptive and explanatory, substitutive, co-ordinative, subsumptive, &c., the number of which seems practically indefinite, and to be determined merely by the extent to which current modes of speech have been taken into consideration by the writer. The limits of the subject as a whole are equally indeterminate. Inquiries rejected by some are admitted and treated as fundamental by others ; the ground of rejection or inclusion appearing really to be whether or not the writer has handled elsewhere or proposes to handle elsewhere these problems.

Chaotic as are the phenomena on which an opinion with respect to Logic has to be based, the general character of that opinion can hardly be matter of doubt. This turmoil of conflicting views is a most hopeful sign. For it indicates that we are beginning to form a logic which shall in some way represent the laws and methods of our thought, and that the stage of preparation, the attainment of some more precise conception of what is truly the function of thought, has been reached. We have, one would trust for ever, given up the conception of thought as a mere formal activity, dissevered from the body of that which makes up

our knowledge, indifferent to content, and obeying only the law of one and two, of Identity and Difference. Probably no theory of thought has ever been so empty and so destructive of genuine thinking as the Formal Logic, miscalled Kantian, which endeavoured to proceed upon that basis. Really, that logic, taken strictly, must resolve its whole contents into one simple practical maxim : " Let thinking be consistent with itself." Whatsoever else it contains must come from without, in the shape of psychological propositions regarding the elements of thinking, or metaphysical assumptions regarding the conditions of what is thought. But, though we are perhaps able to see how futile is the purely formal logic of thought, there is sufficient evidence supplied by our current logical works that we have not yet succeeded in marking off logical discussions proper from general psychology or grammar or merely popular thinking. Even where the view is taken that Logic is a real theory of knowledge, an attempt to unfold completely the processes and laws by which knowledge is formed and systematised, there is an almost constant confusion between the psychological and the logical analysis of knowledge. Knowledge being confessedly a subjective affair, a matter of mind, it is instantly assumed that the same predicates which apply to facts of mind regarded as such are to be found and are operative as logical peculiarities. The doctrine of notions, *e.g.*, tends to become a mere receptacle for psychological discussions regarding the modes of forming ideas, their kinds and the properties of each class—subjects no doubt of psychological interest, but not truly involved in the logical inquiry. The doctrine of judgment is confused by having imported into it a whole mass of disputable matter regarding the nature of belief, or conviction of reality; and theories of the judgment, which are almost as numerous as

treatises on Logic, turn for the most part on psychological differences. Only a vigorous effort to determine generally the fundamental characteristics of the points of view from which Logic and Psychology respectively contemplate knowledge, or a detailed criticism of the several doctrines with this general aim in view, can aid us in coming to a really fruitful decision as to the function and scope of logical science.

It is as making a large and powerful contribution towards this end that one hails Mr Bradley's work. He does not profess to work out in systematic completeness a doctrine of logic; but, partly by polemical discussion of views, partly by presentation of results based on a more sound and penetrating analysis of the function of thought, he has not only cleared the way of much that for long has been an almost insuperable obstacle, but has also drawn attention to the real nature of logical problems and raised the discussion of them to a platform indefinitely higher than that occupied by our current logical thinking. His work is not one of which it is easy to give any brief and connected account, and the difficulties of a reviewer are somewhat aggravated by the peculiarities of the author's style and method. In a matter of this kind, no doubt, much must depend on the individual's turn of thinking; but I should fear that some part of the good effect that ought to be produced by Mr Bradley's work will not be realised because the reader will fail to seize the leading idea of the whole. The discussion grows in complexity as it is developed, and partial views are taken up into and superseded by the more comprehensive solutions. But there is throughout implied a method of regarding the whole business of thought that is not brought with sufficient clearness to the front, and the point of many isolated treatments may in consequence be missed. Mr Bradley has chosen his own way, and has

worked towards a theory of judgment and inference, by taking up, comparing, setting against the current teaching, and carefully sifting empirically selected types of judgments and reasonings. Such a method has its advantages for teaching purposes, but it is apt to mislead unless the underlying principles which guide the whole discussion are clearly discerned. Mr Bradley hardly brings these forward into sufficient prominence, though he might well have done so, and it requires a long-breathed reader to accompany him through his devious course. Perhaps this one complaint may connect itself with the remark in Mr Bradley's preface that critics of different tendencies may object that the treatment contains too much or too little metaphysics. I cannot think that Logic as a whole is in any way independent of Metaphysics, though I fully admit that, as metaphysics covers a multitude of problems, it is not necessary that into every section all the rest should be dragged; nor do I imagine that the occasional distinctions drawn by Mr Bradley between logic and metaphysics indicate a contrary opinion. What is alone of importance is the ultimate view of reality and thought, which is common to all such problems and binds logic and metaphysics into a unity. I do not find that Mr Bradley makes the view on which he proceeds clear, and it appears to me that the force of many of the discussions, in particular that with which the book closes, on the validity of inference, is weakened by the want of some definite statement.

Mr Bradley begins his inquiry with the treatment of the central problem of logical theory, the significance or import of the Judgment, and to this the whole of Book I is devoted. Book II begins the discussion of Inference, and in its first part, expounds certain general types and principles of reasoning as substitute for the rejected syllo-

gism. The second part of the book is entirely critical, and is devoted to an examination of the doctrine of Association with its natural sequels, the idea of reasoning from particulars and the Inductive methods, and to an appreciative though hostile review of Jevons's Equational Logic. Book III resumes the discussion of Inference, brings forward in the first part the main processes in which the essential characteristics of inference are to be detected, and endeavours to reduce these to their most general expression, and in the second part handles the ultimate problem, foreshadowed throughout all the discussion, of the relation between logical truth and real, objective connection. The work, it will be seen, is at once comprehensive and has a certain systematic idea in it. Apart from the main inquiry, moreover, it abounds in good thinking, and no reader can fail to derive benefit from the acuteness with which isolated questions of psychological or metaphysical interest are handled. In truth, one is somewhat embarrassed with Mr Bradley's riches, and would feel inclined at times to wish that he had pruned his work more closely. A little dissatisfaction is inevitable when a promising problem is only hinted at, even though the glance given be one of undeniable acuteness. The frequency with which Mr Bradley is compelled to make brief excursions into psychology and what he chooses to call metaphysics, and the importance of the relative matters, lead us to desire that he had substituted for much occasional disquisition one serious and careful statement of the way in which he regards thought as subject of psychological, logical, and metaphysical treatment respectively. Such a statement is called for, not only in order to illumine his own results, but also as furnishing some guiding thread to his criticism of other views.

Naturally, it is in the theory of Judgment that a logician's fundamental point of view comes to the front, and the judgment is here handled with great elaboration and much subtlety. Experience must have taught every one who has made the attempt how difficult it is to express in other language the results a thinker has come to on a question of the greatest complexity; and I can hardly hope to have succeeded in adequately apprehending all that enters into Mr Bradley's view of what constitutes a judgment. So far, however, as I can determine, his opinions would be somewhat as follows. Judgment is clearly a mental function, that is to say, it can only be understood as part of the complex in which thought and reality stand as opposed to, yet depending on, one another. But as a mental function, judgment is not to be taken as having the characteristics of a mental fact. However valuable may be the results of a psychological investigation of judgment as a fact in the mental life, however much light may be indirectly thrown on its logical nature by tracing the history and conditions of its appearance, the judgment as an element of knowledge, as the very mode of apprehending the real, is not simply a psychical fact, nor can the logical theory of judgment admit any determination of either idea or reality as these are treated for psychology. The constituents of the judgment, idea and reality, are equally necessary and require special definition. The idea is not the mental fact, taken as such; it is part of the general content of the real as apprehended, separated off, fixed and used as a sign or symbol. Relatively to the real, which is substantival, the idea is adjectival. It is known as not itself the real, but it has significance, meaning; and this meaning is definitely referred to the real. In any judgment the idea or ideal content is connected with,

attached to, the real, and the new relation resulting is perceived not to be made by the act of judging but to be independent thereof.

This highly general description of judgment can hardly be quite intelligible until it has received filling-in from contrast with opposed views and from consideration of the new features which complex experience introduces into it. But the view deserves warm recognition as an attempt to see through the thick veils of current doctrine and to seize the very essence of the act of judging. I do not know how far Mr Bradley's illustrations and explanations of the term *idea* will throw light upon the meaning in which it is to be employed; for there is danger, despite his precautions, that the matter will be viewed psychologically; and this danger is perhaps aggravated by the attempt to give a genetic account of the way in which we may suppose judgment to have come about in a developing intelligence. There is a correlative danger, attaching to the term *reality*, on which a word will be said later. What one would desire to insist more strongly upon, is the essential conjunction of the two factors, reality and idea, in judgment, and the impossibility of taking these apart from one another. Popular thinking and psychological considerations tend constantly towards a contrast which is fatal to any theory of thought; and the employment of the term *idea* at all emphasises the contrast in a most hurtful manner.

Provisional acceptance of the general description of judgment enables Mr Bradley to deal summarily with certain definitions of judgment, which err either by abstractly isolating the factors of the judgment or by accepting part for the whole. Such, *e.g.*, are all definitions of judgment as comparison of ideas, under which fall the current explanations of judging as referring to a class,

as asserting identity of subject and predicate, or definitions which are merely adequate or inadequate psychological theorems. The criticisms here are to the point and felicitously expressed.

The discussion of the more abstruse questions regarding the judgment is led up to from the familiar doctrine that, in a categorical judgment, existence of either subject or predicate is not asserted. "All S is P" by no means forces the assertor to the admission that either S or P exists. S and P are merely ideal contents, and the judgment is no more than the statement that these are so connected that if the one, then the other as qualified by the first. Difficulties of this kind have recently begun to find their way into our current logical discussions, not without most hopeful results.[1] Clearly, if a solution is to come at all, and is to affect our distribution of logical judgments, it must be arrived at by a more profound consideration of the reference to reality that has appeared as a constituent of the judgment. Mr Bradley advances to the task by contrasting in a general way the characteristics of reality and truth. The real is individual, self-existent, substantival. Truth on the other hand, as having to do with the idea, has no one of these characteristics. At first sight, then, it would seem that all truth is hypothetical merely, that it expresses only well or ill founded connections of ideal contents in our minds. To come closer to the problem, there is introduced a provisional classification of categorical assertions, into (1) analytic judgments of sense, in which the given is merely

[1] See, *e.g.*, Mr Venn in *Symbolic Logic*, and Mr A. Sidgwick's very thoughtful treatment of Abstract and Concrete Propositions in *Fallacies*.

described by one of its parts, (2) synthetic judgments of sense, in which the real of sense-perception, involved in the assertion, transcends what is immediately given, (3) those in which the real referred to is not a fact of perception. Scrutiny of these yields as result the important principles, that the real, even when taken in the sense of the real in perception, is not identical with its momentary appearance in perception, said momentary appearance, indeed, being an incognisable atom when taken in isolation; that the real, taken in more or less limited fashion, is ideally determined and directly referred to in the analytic judgments; that the real is indirectly referred to in synthetic judgments and is in them taken to be a continuous identity underlying the momentary phenomenal appearance. All such judgments are singular and appear to be categorical, to imply assertion of the real and of its elements as appearing in the judgment. Universal abstract judgments and hypotheticals, on the other hand, appear to assert merely necessary connection of ideal content, and therefore point only to that in the real which is the ground of the consequence necessarily following. In the judgment, "If S, then P," we only assert that if the real be qualified as S, then it will present also the qualification P; we do not assert that the real is either S or P.

But to rest content with such a view is to do grave injustice to the function of thought and to take an extremely imperfect and abstract aspect of the real as the whole of its significance. In the concluding sections of his second chapter Mr Bradley advances towards a completer doctrine of the kinds of propositions. He has little trouble in showing that synthetic judgments of sense, which transcend the given, proceed on a principle not distinguishable

from that which characterises the hypothetical, while analytic judgments of sense, though professing to give the real, do so only by a process of mutilation that is concealed by ordinary language but is fatal to their claims as absolutely and simply true. The terms of which the singular analytic judgment consists are universal, are wholly inadequate to express the concrete reality that is assumed. Such judgments are in fact the poorest and most abstract, giving the least expression of reality. Like all other judgments they do refer to reality, but they refer in the least definite, most hypothetical fashion. Abstract judgments, though on one side to be described as hypothetical, for they do not assert the existence of their elements, are on another side categorical, for they do imply a quality of the real and express the nature of the real as the realm of law, of systematic connection of facts.

The negative judgment (ch. iii), Mr Bradley regards as resting essentially on the recognised exclusion by the real of a suggested ideal determination. It implies, therefore, in all cases a recognised ground of exclusion, a positive element, though the nature of this ground need not be the same in all cases of negation. It is with satisfaction that one sees the blank form Not-A assigned to its true place (pp. 118-9, *cf.* pp. 147-8), but the whole tenor of this chapter and occasional special statements (pp. 109, 116) tend rather strongly towards the purely subjective interpretation of judgment which is the gulf always yawning beside the logician. The disjunctive judgment (ch. iv) is shown to involve a categorical assertion regarding the disparate members of a whole predicate, a hypothetical determination of the subject in reference to these disparates, and a general assumption or inference regarding the totality of the sphere which is divided.

Chapter v, on the Principles of Identity, Contradiction, Excluded Middle, and Double Negation, is perhaps one of the least satisfactory, not because there is much in it from which one would dissent, but because it does not seem possible to discuss with any profit these principles from the point of view which the author is taking. If we regard judging as part of the subjective process of knowing, these principles have only relative significance. In their abstract and general form they can only be handled in what we think Mr Bradley would call metaphysics. Not much is to be gained by treating truth in isolation, and so rendering the Law of Identity, *e.g.*, as that it merely expresses the abstractness of truth (p. 133), and, similarly, the dialectic method requires not to be compared with Contradiction and Excluded Middle when these are taken from the same point of view.

Chapters vi and vii, on Quantity and Modality, raise a multiplicity of questions. Want of space prevents my doing more than call attention to the excellent treatment of the general basis of probable reasoning which is given in ch. vii; to a general statement of the chapter I shall have occasion later to refer. The treatment of quantity raises two problems—first, that of extension and intension, second, that of the meaning to be assigned to universal and particular. In respect to both, the ordinary logic has accepted partial doctrines either from uncritical experience or from psychology, and Mr Bradley's review, though probably not final, does good service in pointing out the unspeakable confusion that prevails regarding them. In his treatment Mr Bradley is led to fall foul of two familiar doctrines, the one that some names are non-connotative, the other that extensions and intensions vary inversely. There is no doubt that the word "connotation"

has crept into logic without being able to yield a very satisfactory account of itself, and the modern use of it, dating doubtless from Mill's *Logic*, is entirely at variance with its earlier acceptation. From some points of view the distinction indicated by it becomes comparatively worthless; but I do not know that there is not a positive advantage in having a word which shall indicate the specific property of a sign when used to designate a class. The matter is mainly grammatical, not logical; but I do not think that it is at all necessary to identify connotation with *signification*, and so, because all signs have signification, to assert that they all have connotation. In like manner the doctrine of inverse relation between extension and intension has doubtless been applied in a wholly absurd and senseless fashion; but I imagine that in the long run the meaning of the doctrine will be found to rest on the peculiar relation between genus and species, and to result from taking abstractly a truth which would have a different expression when all the elements are taken together.

The current doctrine regarding extension and comprehension in judgments, if indeed there is any one doctrine on the subject, is sufficiently confused; and it seems hardly worth while to contrast with it in detail a new reading of these distinctions. If the definition of judgment adopted by Mr Bradley be carried out, and the subject be taken not as the grammatical subject which appears in the verbal statement, but as the ultimate reality, then it is easily seen that, as implying ideal content, the judgment may be read in comprehension, while, as referring to the real, it may be read in extension. The distinction is hardly worth retaining. So the current doctrine of the quantity of propositions can be shown to rest on little more than grammatical peculiarities of verbal expressions, and critics have had

little trouble in collecting empirical expressions which by no ingenuity can find reasonable explanation within that doctrine. Even in recent treatises the attempt to remodel the current teaching on quantity has hardly gone further than the introduction of distinctions between law and instance, abstract universality and concrete particularity, which are far from exhausting the matter. It is interesting to note the manner in which Mr Bradley is driven to what he has called specially metaphysical determinations in order to effect an explanation of quantitative differences. Ideal content he appears to take as in itself universal: it has no quantitative determinations in it; but such content is only one element in the judgment. The real which is the correlative factor is shown to contain in itself the mutually determining features of abstract universality and abstract particularity, and to have therefore in its individual character the aspects of the universal—the identity of differences,—and of the particular—the differences of this identity. The real is thus concrete, and may appear as either concrete universal, or concrete particular, or the individual which is the truth of both. And the ideal content is at once seen to be an abstract, just as worthless as the assumed atomic, ultimate, undetermined real. This is a most important result; it affects the whole doctrine of judgment, and enables us to see that the judgment is nothing but the way in which the elements of the only reality, the thing which is known or has its notion, are held apart from one another so that their mutual implication becomes apparent. If we please we may express this in a subjective fashion, and think of the process as that in which the real is determined by some idea in us; but such a translation is dangerous, as in all probability leading to an opposition of real and ideal which can have no place in the judgment

per se. We may ask, and the question appears at the close of Mr Bradley's work, what signifies this fundamental form of consciousness, the reference of knowledge to reality? how comes it that in our judging and reasoning we should at once seem to be merely reproducing in ideal fashion a reality that is completely given, and at the same time supplying intelligible shape and substance for a matter that is relatively abstract and undetermined? But we must be careful not to prejudge the answer by introducing into our very notion of the judgment a reference to the abstract subject. That in the mental development of the concrete spirit judgment does come about through the opposition of perceptions, representations, and the like, is a fact with which Logic does not require to concern itself.

In his Second Book Mr Bradley passes to the consideration of Reasoning. Part of the book is occupied with a polemical review of the theory of knowledge that has sprung from the psychological doctrine of Association of Ideas. With respect to this part I can only say here that I think Mr Bradley most successful in his criticism, and that the chapter on Association is a valuable contribution towards a sounder psychology. The chapter on the Inductive Methods sums up, from a higher point of view than has generally been taken, the difficulties which most serious critics of Mill's *Logic* have felt in their regard. I am glad to find that Mr Bradley takes a view which I have more than once expressed, that a false prominence has been attached to these methods as parts of the general doctrine of Inference supported by Mill. The chapter on Equational Logic is acute and ingenious. I imagine that the ground of Mr Bradley's strongly expressed approval of a doctrine deviating so widely from his own is the conviction that the Equational Logic avoids at all events the numberless

psychological abstractions of the ordinary and empirical logic, and that it does make a vigorous effort to describe the modes in which we deal with the real in knowledge.

The Third Book continues the analysis of Reasoning and leads up to the final logical problems. I am well aware that no brief abstract can give a fair idea of the merits of the prolonged treatment of inference which is contained in these books, and that any attempt to compress the author's results simply casts into the shade the most interesting and instructive part of his work. The nature and forms of inference are handled with unwearied patience; such parts of the current logic as specially concern themselves with the foundation of the process are sifted and examined with minute and sometimes exhausting care; incidental problems receive brief and generally luminous discussion. A brief statement, moreover, must do injustice to the individuality of Mr Bradley's method, which is such as, I think, will cause trouble to many of his readers. Mr Bradley begins with a general view of inference which is later on altered in accordance with the distinctions arrived at in the course of the discussion. Regarding inferences as a process in which a new truth is reached from something accepted, he more formally translates these popular terms into the statement that an inference is an ideal construction resulting in the perception of a new connection. A conclusion, as such, is not something merely given; it is reached. The accepted data are not isolated elements standing apart from the conclusion. In the process they are looked at, placed together, put in a relation to one another, ideally experimented on, and the result is a new relation perceived or the perception of a new relation. This general statement and the empirical examples which cohere with it lead to a very vehement polemic against our ancient friend the

Syllogism. Mr Bradley's grounds of quarrel are varied. He denies that schemata, general forms of valid inference, can be laid down: we can indicate only the general heads of relation within which by ideal experiment a new relation can be reached; we can indicate only the general principle which guarantees the possibility inferring under each category. Let the category, for example, be that of synthesis in space, as when I say "A is to the right of B, and B is to the right of C"; then there can be indicated generally what kind of conclusion can be drawn and the principle of connection on which the ideal experiment proceeds. The actual conclusion is perceived, seen to follow, and is not drawn by any rigid syllogistic process. Again, the syllogism has insisted on a major premiss, has viewed inference as being procedure by subsumption of a less under a more general. Not only is this hard to reconcile with the notion of inference as giving a new relation; not only is it quite out of keeping with the kinds of reasoning that occur constantly in experience, *e.g.*, mathematical construction and the like; but it altogether misconceives the relation between a principle of reasoning and the reasoning itself. A principle is not a general model or axiom by reference to which we reason; reasoning is a function which embodies a principle, is its living exponent. The two are not to be severed as they are in syllogism.

Dismissing, thus, the syllogism—and I think that, as that form is commonly expressed, we should agree in doing so, though perhaps with milder language—Mr Bradley notes the main principles which underlie his types of reasoning. These are identity within the elements of the ideal experiment and universality of one premiss—different aspects of the same. This identity, as previously in the case of the so-called law of thought, is taken with a genuine meta-

physical significance, but here with a possibly misleading stress laid on the subjective side. The ground of reasoning, it is said, is the assumed real identity of that which is identical in ideal content; by which one might well understand the empty identity of the syllogistic form, that the middle term shall be the *same*. But we cannot take "ideal content" in this abstract sense, or regard it as in any way conditioned by the subjective process of thinking. It is significance or meaning, the real viewed in its essential character for thought as the union of universal and particular. The notion of correspondence between ideal content and reality is ambiguous and can only lead to a quite contradictory result. On this ground I am altogether disinclined to accept, in lieu of the syllogism, as necessarily arising out of judgment, the subjective processes of construction and the like on which Mr Bradley expands himself. Nor do I follow him in his criticism of the syllogistic form as fallaciously attempting to draw a conclusion which must be left to the private judgment of the individual thinker. No doubt, the ordinary mode of expressing the syllogism—through concrete instances—is deeply in fault; no doubt, also, the class-idea on which the syllogism is made to turn is a veritable abstraction which cannot be regarded as the life of reasoning. But the concrete inferences, which are supposed to show the incompetence of syllogistic form and to be products of ideal experimentations, do in themselves involve the fundamental categories of universal, particular, and individual, of whose connection the syllogism is but the form. That from these categories taken *in abstracto* inferences in concrete matter can be drawn is of course false; but it does not seem at all needful, in order to rescue the syllogism from oblivion, to insist that concrete thinking involves nothing more than these abstract categories. To

reject the syllogism and to lay all stress upon these processes—construction, comparison, abstraction, and the like—is to tend towards a purely subjective reading of thought, and to interpret the real as a kind of unknowable, foreign to thought, and only assumed, on grounds good or bad, to conform in some way to it.

With much care and elaboration Mr Bradley in his Third Book works out the forms in which as it seems to him inference really proceeds, finally bringing them under the two rubrics Analysis and Synthesis, with indication of a third process (perhaps System) at the root of which lies the ultimate idea of the real as concrete individuality, unfolding itself in its peculiar forms into all the richness of existence. Such third process, which perhaps connects itself with the class of judgments not expressly handled, those in which the subject is non-phenomenal reality, is but hinted at, and the problem raised by it is treated in the concluding chapters from a narrower point of view. Briefly, the question there raised is that of the validity of inference—a many-sided question, the mere formulation of which in its true terms is philosophy at large. Mr Bradley approaches it from various sides, discussing the relation of ground of knowledge to ground of existence, of formal validity to real truth, and finally of knowing as a whole to fact known. The difficulty, which no one will be more ready to acknowledge than Mr Bradley himself, of coming to a perfect understanding with regard to the significance of the terms employed in so abstruse a discussion, and the dependence of any meaning on a more or less developed philosophic view, render it impossible to do more than remark on one or two of the aspects of the treatment here given. Mr Bradley refers in his discussion to Lotze; and most readers of the *Logik* will remember the

stringent criticism to which the claims of logical forms to real validity are subjected. But, at the same time, it ought not to be forgotten that such criticism rested on a metaphysical basis, on a theory of the soul and of psychical life, which rendered it absolutely necessary to regard logical forms as being mere products of the psychological mechanism *under certain presuppositions*. The whole difficulty which rises out of the very term "truth" was simply cast back into the undetermined field of assumptions; for by these assumptions only can "reality" have a significance for us. To follow in this track is to play with the term "reality" and to be driven in the long run to the *caput mortuum* of the "thing-in-itself." I do not imagine that Mr Bradley takes this track,—there is much in his book that so would be incomprehensible; but he undoubtedly speaks as if the nature of thought were such as to render reality altogether foreign to it, and sometimes treats phenomenal reality, momentary appearance, as if it had supreme worth and supplied a touchstone for the validity of reasoning. Knowledge is subjective, unquestionably, and it is not reality, simply because it is knowledge; but it is not on that account to be regarded either as a complex, accidental growth in the individual spirit, or as doomed for ever to face its own insoluble problem. If we seriously treat knowledge as one of the modes of thought in and for which reality has any significance, we may come to see why there is continuously present therein the opposition of knowing and being, which, hastily interpreted and mixed with foreign considerations, might lead to an abstract severance of the two. Possibly, also, those minor queries, such as that relating to the cause and the reason in knowledge, would yield to an investigation of the true significance of the relative categories employed.

I am in doubt to what extent these remarks do injustice to Mr Bradley's point of view; but the definition he has given of judgment, his interpretation of the modal categories, his development of the forms of inference, his frequent excursions into the psychology of knowledge, and his final discussion of reality, seem to me to imply a view hardly in keeping with the general tenor of the book, and possibly, if worked out, destructive to much that appears there. However that may be, there is this to be said, that from few books of recent philosophy is there more to be learned than from the present work. No reader can fail to learn much or to be stimulated in the best way by the abundant criticism that is bestowed upon logical and psychological doctrines; there is none who cannot benefit by the remarkable patience, circumspection, and acuteness with which the author handles each logical question. That a work should be calculated to raise the whole standard of discussion in its subject is perhaps the highest praise that can be given; in my judgment such praise can be unreservedly accorded to Mr Bradley's treatment of the Principles of Logic.

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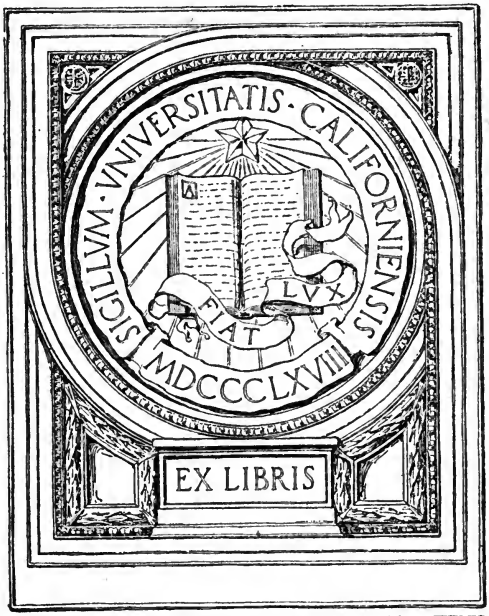
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A Primer of Logic

BY

HENRY BRADFORD SMITH

Assistant Professor of Philosophy in the University of Pennsylvania

UNIV. OF CALIFORNIA

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PREFACE

In the pages which follow will be found the outlines of the logic of a set of categorical forms which are not Aristotle's own. It is only the fragment of a general theory, but the content of all the chapters of the old logic, which are commonly regarded as essential, except that one which deals with the calculus of classes, will be found included. In the first appendix the relation of these new forms to the traditional ones has been pointed out in detail.

I have at least one debt, which calls for a definite acknowledgement. It is to my friend and teacher, Mr. Edgar A. Singer, Jr., that I owe what training I have had in the science. He has never failed, through hints thrown out in conversation, to correct my misapprehensions. But my indebtedness is more specific than this. I have so far employed his own method, a method developed in his academic lectures, that I could scarcely have ventured upon the publication of these outlines of a theory without his express permission.

H. B. S.

376930

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CHAPTER I

§1. In 1846 Sir William Hamilton published the prospectus of an essay on a "New Analytic of Logical Forms,"* which revived the question as to whether or not the quantity of the predicate of the categorical forms should be stated explicitly. The chief difficulties of his system result from the ambiguity of the meaning of *some*, from the impossibility of making every form of categorical expression simply convertible, and from the seemingly curious effort to establish an order of *better* and *worse* between the relations connecting subject and predicate. Four of Hamilton's eight forms are redundant. The four that remain will be represented here by the letters, α, β, γ, ϵ.

Accordingly let

α_{ab} = all a is all b,
β_{ab} = some a is some b,
γ_{ab} = all a is some b,
ϵ_{ab} = no a is b.

Here *some*, the *some* expressed explicitly in β and γ, means *some at least, not all.* This meaning of the word is established unambiguously by the properties of the forms. In addition to these abbreviations we will employ the notation:

$x_{ab} = x_{ab}$ (is true),
$x'_{ab} = x_{ab}$ (is false),
$x_{ab} \cdot y_{ab} = x_{ab}$ (is true) and y_{ab} (is true),
$x_{ab} + y_{ab} = x_{ab}$ (is true) or y_{ab} (is true),
$x_{ab} \angle y_{ab} = x_{ab}$ (is true) implies y_{ab} (is true),
$(x_{ab} \angle y_{ab})' = x_{ab}$ (is true) does not imply y_{ab} (is true).

---

*Lectures on Logic, ed. by Mansel and Veitch, Boston, Gould and Lincoln, 1863.

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§2. The implications, which are given below, express the chief characteristics of the forms. The theorems follow by the principle of the denial of the consequent, which may be written in the two forms:

$$(x \angle y') \angle (y \angle x') \text{ and } (x' \angle y)' \angle (y' \angle x)'.$$

*Postulates:**

$\alpha_{ab} \angle \beta'_{ab}$	$\beta_{ab} \angle \gamma'_{ab}$	$(\alpha'_{ab} \angle \beta_{ab})'$	$(\beta'_{ab} \angle \gamma_{ab})'$
$\alpha_{ab} \angle \gamma'_{ab}$	$\beta_{ab} \angle \epsilon'_{ab}$	$(\alpha'_{ab} \angle \gamma_{ab})'$	$(\beta'_{ab} \angle \epsilon_{ab})'$
$\alpha_{ab} \angle \epsilon'_{ab}$	$\gamma_{ab} \angle \epsilon'_{ab}$	$(\alpha'_{ab} \angle \epsilon_{ab})'$	$(\gamma'_{ab} \angle \epsilon_{ab})'$
$\gamma_{ab} \angle \gamma'_{ba}$		$(\gamma'_{ab} \angle \gamma_{ba})'$	

Theorems:

$\epsilon_{ab} \angle \alpha'_{ab}$	$\gamma_{ab} \angle \alpha'_{ab}$	$(\epsilon'_{ab} \angle \alpha_{ab})'$	$(\gamma'_{ab} \angle \alpha_{ab})'$
$\epsilon_{ab} \angle \beta'_{ab}$	$\gamma_{ab} \angle \beta'_{ab}$	$(\epsilon'_{ab} \angle \beta_{ab})'$	$(\gamma'_{ab} \angle \beta_{ab})'$
$\epsilon_{ab} \angle \gamma'_{ab}$	$\beta_{ab} \angle \alpha'_{ab}$	$(\epsilon'_{ab} \angle \gamma_{ab})'$	$(\beta'_{ab} \angle \alpha_{ab})'$

Let us postulate in addition that:

$\alpha_{ab} \angle (\alpha'_{ab})'$	$(\alpha'_{ab})' \angle \alpha_{ab}$
$\beta_{ab} \angle (\beta'_{ab})'$	$(\beta'_{ab})' \angle \beta_{ab}$
$\gamma_{ab} \angle (\gamma'_{ab})'$	$(\gamma'_{ab})' \angle \gamma_{ab}$
$\epsilon_{ab} \angle (\epsilon'_{ab})'$	$(\epsilon'_{ab})' \angle \epsilon_{ab}$

Then, if $k_{ab} \neq w_{ab}$ and if k_{ab} and w_{ab} represent only the unprimed letters, $\alpha_{ab}, \beta_{ab}, \gamma_{ab}, \epsilon_{ab}$, a complete induction of the propositions given above yields the general result:

$$k_{ab} \angle (k'_{ab})', \quad (k'_{ab})' \angle k_{ab}, \qquad \text{I}$$

$$k_{ab} \angle w'_{ab}, \quad (w'_{ab} \angle k_{ab})', \qquad \text{II}$$

---

*These assumptions are in accord with those of the common logic, but no longer hold when the terms are allowed to take on the limiting values 0 and 1; for γ_{01} and ϵ_{01} are both true propositions. The assumptions $(\gamma_{ab} \angle \epsilon'_{ab})'$ and $(\epsilon_{ab} \angle \gamma'_{ab})'$ will be characteristic of a more general logic, which will include the classical logic as a special case. (See the concluding remarks of chapter III.)

and by denial of the consequent,

$$(x \angle y) \angle (y' \angle x'),$$
$$(x \angle y)' \angle (y' \angle x')',$$

it follows that:

$$(k'_{ab})' \angle w'_{ab}, \quad (w'_{ab} \angle (k'_{ab})')'. \qquad \text{III}$$

If now we postulate:

$$(\alpha_{ab} \angle \alpha'_{ab})' \qquad (\alpha'_{ab} \angle \alpha_{ab})'$$
$$(\beta_{ab} \angle \beta'_{ab})' \qquad (\beta'_{ab} \angle \beta_{ab})'$$
$$(\gamma_{ab} \angle \gamma'_{ab})' \qquad (\gamma'_{ab} \angle \gamma_{ab})'$$
$$(\epsilon_{ab} \angle \epsilon'_{ab})' \qquad (\epsilon'_{ab} \angle \epsilon_{ab})'$$

and, consequently,

$$(k_{ab} \angle k'_{ab})', \quad (k'_{ab} \angle k_{ab})',$$

it will follow by*

$$(x \angle y)\ (x \angle z)' \angle (y \angle z)',$$
$$(x \angle z)'\ (y \angle z) \angle (x \angle y)',$$

that $(k_{ab} \angle (w'_{ab})')', \quad ((w'_{ab})' \angle k_{ab})'.$ IV

Finally if we assume

$$\alpha_{ab} \angle \alpha_{ba}, \quad \beta_{ab} \angle \beta_{ba}, \quad \gamma_{ab} \angle \gamma_{ab}, \quad \epsilon_{ab} \angle \epsilon_{ba},$$

it will follow, by

$$(x \angle y)\ (y \angle z) \angle (x \angle z) \text{ and } (x \angle y) \angle (y' \angle x'),$$

that

$$k_{ab} \angle k_{ab}, \quad k'_{ab} \angle k'_{ab}. \qquad \text{I}'$$

Definitions.

If $x_{ab} \angle y'_{ab}$ and $y'_{ab} \angle x_{ab}$, x_{ab} is said to be *contradictory* to y_{ab}. By I, k_{ab} is contradictory to k'_{ab} and, by I′, k'_{ab} is contradictory to k_{ab}.

---

*These are obtained from $(x \angle y)\ (y \angle z) \angle (x \angle z)$ by $(xy \angle z) \angle (xz' \angle y')$ and $xy \angle yx$.

If $x_{ab} \angle y'_{ab}$ and $(y'_{ab} \angle x_{ab})'$, x_{ab} is said to be *contrary* to y_{ab}. By II, k_{ab} is contrary to w_{ab}, and conversely, since k_{ab} and w_{ab} are interchangeable.

If $(x_{ab} \angle y'_{ab})'$ and $y'_{ab} \angle x_{ab}$, x_{ab} is said to be *subcontrary* to y_{ab}. By III, k'_{ab} and w'_{ab} are subcontrary pairs.

If $(x_{ab} \angle y'_{ab})'$ and $(y'_{ab} \angle x_{ab})'$, x_{ab} is said to be *subalternate* to y_{ab}. By IV, k'_{ab} and w_{ab} are subalternate pairs.

§3. Having classified the categorical forms under these heads, it remains to differentiate them by means of their formal properties. If we assume as valid,

$$\alpha'_{aa} \angle \alpha_{aa}, \quad \epsilon'_{a\bar{a}} \angle \epsilon_{a\bar{a}}, \quad (\alpha_{aa} \angle \alpha'_{aa})', \quad (\epsilon_{a\bar{a}} \angle \epsilon'_{a\bar{a}})',$$

where $\bar{a}$ represents the class contradictory to a, (non-a), the other propositions given below may be derived.*

$$\begin{array}{llll} \alpha'_{aa} \angle \alpha_{aa} & (\alpha_{aa} \angle \alpha'_{aa})' & \alpha_{a\bar{a}} \angle \alpha'_{a\bar{a}} & (\alpha'_{a\bar{a}} \angle \alpha_{a\bar{a}})' \\ \beta_{aa} \angle \beta'_{aa} & (\beta'_{aa} \angle \beta_{aa})' & \beta_{a\bar{a}} \angle \beta'_{a\bar{a}} & (\beta'_{a\bar{a}} \angle \beta_{a\bar{a}})' \\ \gamma_{aa} \angle \gamma'_{aa} & (\gamma'_{aa} \angle \gamma_{aa})' & \gamma_{a\bar{a}} \angle \gamma'_{a\bar{a}} & (\gamma'_{a\bar{a}} \angle \gamma_{a\bar{a}})' \\ \epsilon_{aa} \angle \epsilon'_{aa} & (\epsilon'_{aa} \angle \epsilon_{aa})' & \epsilon'_{a\bar{a}} \angle \epsilon_{a\bar{a}} & (\epsilon_{a\bar{a}} \angle \epsilon'_{a\bar{a}})' \end{array} \quad \text{V}$$

The results of V, together with the non-convertible character of γ**, are enough to establish the definitions of the four forms.

---

*Under the conditions mentioned above, in note, p. 2, we shall have to write $(\gamma_{a\bar{a}} \angle \gamma'_{a\bar{a}})'$. Implications V are an extension of the meaning of implication, made necessary by our having to call α_{aa} and $\epsilon_{a\bar{a}}$ true propositions. (See Boole, Investigation of the Laws of Thought, chap. XI, p. 169.)

**The operation of simple conversion consists in interchanging subject and predicate. By the principle, $(x \angle z)'(y \angle z) \angle (x \angle y)'$, and what has gone before, we have:

$$(\gamma_{ab} \angle \gamma'_{ab})'(\gamma_{ba} \angle \gamma'_{ab}) \angle (\gamma_{ab} \angle \gamma_{ba})'.$$

Definitions.

A form which is the contrary of itself is called a null-form. By V, β_{aa}, γ_{aa}, ϵ_{aa}, $\alpha_{a\bar{a}}$, $\beta_{a\bar{a}}$, $\gamma_{a\bar{a}}$, are null-forms.

A form which is the subcontrary of itself is called a one-form. By V, α_{aa}, $\epsilon_{a\bar{a}}$, are one-forms.

If x_{ab} is unprimed and x_{aa} a one-form then x_{ab} is called an α-form.

If x_{ab} is unprimed and simply convertible and if x_{aa} and $x_{a\bar{a}}$ are null-forms, then x_{ab} is called a β-form.

If x_{ab} is unprimed and not simply convertible, then x_{ab} is called a γ-form.

If x_{ab} is unprimed and $x_{a\bar{a}}$ a one-form, then x_{ab} is called an ϵ-form.

EXERCISES

(1) Assuming $k_{ab} = k_{ab} \cdot k_{ab}$, $k_{ab} \angle w'_{ab}$, show that,

$$\alpha_{ab} \angle \beta'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba}$$
$$\beta_{ab} \angle \alpha'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba}$$
$$\gamma_{ab} \angle \alpha'_{ab}\ \beta'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba}$$
$$\epsilon_{ab} \angle \alpha'_{ab}\ \beta'_{ab}\ \gamma'_{ab}\ \gamma'_{ba}$$

by the aid of,

$$(x \angle y)\ (y \angle z) \angle (x \angle z),$$
$$(x \angle y) \angle (zx \angle zy).$$

Equality is defined by

$$(x \angle y)\ (y \angle x) \angle (x = y),$$
$$(x = y) \angle (x \angle y)\ (y \angle x).$$

If now

$$\beta'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \angle \alpha_{ab}$$
$$\alpha'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \angle \beta_{ab}$$
$$\alpha'_{ab}\ \beta'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \angle \gamma_{ab}$$
$$\alpha'_{ab}\ \beta'_{ab}\ \gamma'_{ab}\ \gamma'_{ba} \angle \epsilon_{ab}$$

it will follow that

$$\alpha_{ab} = \beta'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \qquad \alpha'_{ab} = \beta_{ab} + \gamma_{ab} + \epsilon_{ab} + \gamma_{ba}$$
$$\beta_{ab} = \alpha'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \qquad \beta'_{ab} = \alpha_{ab} + \gamma_{ab} + \epsilon_{ab} + \gamma_{ba}$$
$$\gamma_{ab} = \alpha'_{ab}\ \beta'_{ab}\ \epsilon'_{ab}\ \gamma'_{ba} \qquad \gamma'_{ab} = \alpha_{ab} + \beta_{ab} + \epsilon_{ab} + \gamma_{ba}$$
$$\epsilon_{ab} = \alpha'_{ab}\ \beta'_{ab}\ \gamma'_{ab}\ \gamma'_{ba} \qquad \epsilon'_{ab} = \alpha_{ab} + \beta_{ab} + \gamma_{ab} + \gamma_{ba}$$

The second set of equations follows from the first by the principle, that the contradictory of a product is the sum of the contradictories of the separate factors, and by substituting k_{ab} directly for $(k'_{ab})'$.

(2) Show by the method of the last example that

$$\alpha_{ab} = \alpha_{ab}\ \beta'_{ab} = \alpha_{ab}\ \gamma'_{ab} = \alpha_{ab}\ \epsilon'_{ab}$$
$$\beta_{ab} = \beta_{ab}\ \alpha'_{ab} = \beta_{ab}\ \gamma'_{ab} = \beta_{ab}\ \epsilon'_{ab}$$
$$\gamma_{ab} = \gamma_{ab}\ \alpha'_{ab} = \gamma_{ab}\ \beta'_{ab} = \gamma_{ab}\ \epsilon'_{ab}$$
$$\epsilon_{ab} = \epsilon_{ab}\ \alpha'_{ab} = \epsilon_{ab}\ \beta'_{ab} = \epsilon_{ab}\ \gamma'_{ab}$$

Show too that

$$\alpha_{ab} = \alpha_{ab}\ \beta'_{ab}\ \gamma'_{ab} = \alpha_{ab}\ \beta'_{ab}\ \epsilon'_{ab} = \alpha_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}, \text{ etc., etc.}$$

and that $\alpha_{ab} = \alpha_{ab}\ \beta'_{ab}\ \gamma'_{ab}\ \epsilon'_{ab}$, etc., etc.

Derive the analogues of the first set:

$$\alpha'_{ab} = \alpha'_{ab} + \beta_{ab} = \alpha'_{ab} + \gamma_{ab} = \alpha'_{ab} + \epsilon_{ab}, \text{ etc., etc.}$$

Accordingly, since $k_{ab} = k_{ab} \cdot w'_{ab}$ and $k'_{ab} = k'_{ab} + w_{ab}$, any primed letter is a modulus of multiplication with respect to any unprimed letter not itself and any unprimed letter is a modulus of addition with respect to any primed letter not itself.

The propositional *zero* is defined by

$$(xy \angle (xy)') \angle (xy \angle 0),$$
$$(xy \angle 0) \angle (xy \angle (xy)'),$$

and the propositional *one* by

$$((xy)' \angle xy) \angle (1 \angle xy),$$
$$(1 \angle xy) \angle ((xy)' \angle xy).$$

From the principles,

$$(x \angle y') \angle (xy \angle (xy)'),$$
$$(xy \angle (xy)') \angle (x \angle y'),$$

it follows that

$$(x \angle y') \angle (xy \angle 0)$$
$$(xy \angle 0) \angle (x \angle y')$$

(3) Derive:

$k_{ab} \cdot k'_{ab} \angle (k_{ab} \cdot k'_{ab})'$; $(k_{ab} + k'_{ab})' \angle k_{ab} + k'_{ab}$;
$k_{ab} \cdot w_{ab} \angle (k_{ab} \cdot w_{ab})'$; $((k_{ab} + w_{ab})' \angle k_{ab} + w_{ab})'$;
$(k'_{ab} \cdot w'_{ab} \angle (k'_{ab} \cdot w'_{ab})')'$; $(k'_{ab} + w'_{ab})' \angle k'_{ab} + w'_{ab}$;
$(k_{ab} \cdot w'_{ab} \angle (k_{ab} \cdot w'_{ab})')'$; $((k_{ab} + w'_{ab})' \angle k_{ab} + w'_{ab})'$.

(4) Show that

$$\alpha_{ab}\, \beta_{ab} \angle 0,\ \alpha_{ab}\, \gamma_{ab} \angle 0, \text{ etc.}$$
$$1 \angle \alpha'_{ab} + \beta'_{ab},\ 1 \angle \alpha'_{ab} + \gamma'_{ab}, \text{ etc.}$$

and that

$$\alpha'_{ab}\, \beta'_{ab}\, \gamma'_{ab}\, \epsilon'_{ab}\, \gamma'_{ba} \angle 0$$
$$1 \angle \alpha'_{ab} + \beta'_{ab} + \gamma'_{ab} + \epsilon'_{ab} + \gamma'_{ba}$$

(5) Assuming $x_{ab} = x_{ab} \cdot x_{ab}$, $x_{ab} = x_{ab} + x_{ab}$, show that

$$\alpha'_{ab}\, \beta'_{ab} = \gamma_{ab} + \epsilon_{ab} + \gamma_{ba},\ \alpha'_{ab}\, \gamma'_{ab} = \beta_{ab} + \epsilon_{ab} + \gamma_{ba}, \text{ etc.}$$
$$\alpha_{ab} + \beta_{ab} = \gamma'_{ab}\, \epsilon'_{ab}\, \gamma'_{ba},\ \alpha_{ab} + \gamma_{ab} = \beta'_{ab}\, \epsilon'_{ab}\, \gamma'_{ba}, \text{ etc.}$$

(6) Derive the general result:

$$(k_{a,b} \angle w_{a,b})'.$$

The comma between the terms indicates that the term order is not fixed. Thus $k_{a,b}$ stands for either k_{ab} or k_{ba}.

(7) From the principle,

$$(x \angle z)' (y \angle z) \angle (x \angle y)',$$

and the postulate $(\alpha_{aa} \angle \alpha'_{aa})'$,
derive $(\alpha_{aa} \angle \beta_{aa})'$, $(\alpha_{aa} \angle \gamma_{aa})'$, $(\alpha_{aa} \angle \epsilon_{aa})'$.

(8) From the principles,

$$(x \angle y) (y \angle z) \angle (x \angle z),$$
$$(x' \angle x) \angle (y \angle x),$$
$$(x \angle x') \angle (x \angle y),$$

and the postulate, $\alpha'_{aa} \angle \alpha_{aa}$, show that all propositions of the form $x_{aa} \angle y_{aa}$, except the three cases in the last example, are valid implications, x_{aa} and y_{aa} representing only the unprimed letters.

(9) By the method of the last example, prove that $(\alpha_{aa} \angle \alpha'_{aa})'$ is the only invalid implication of the form $x_{aa} \angle y'_{aa}$.

(10) Derive seven valid implications in each one of the forms $x'_{aa} \angle y_{aa}$ and $x'_{a\bar{a}} \angle y_{a\bar{a}}$ and nine invalid implications of each one of the same forms.

(11) From $(\epsilon_{a\bar{a}} \angle \epsilon'_{a\bar{a}})'$ by the method of example 7 derive $(\epsilon_{a\bar{a}} \angle \alpha_{a\bar{a}})'$, $(\epsilon_{a\bar{a}} \angle \beta_{a\bar{a}})'$, $(\epsilon_{a\bar{a}} \angle \gamma_{a\bar{a}})'$.

(12) From $\epsilon'_{a\bar{a}} \angle \epsilon_{a\bar{a}}$ by the method of example 8 derive thirteen valid implications.

(13) Show that $(\epsilon_{a\bar{a}} \angle \epsilon'_{a\bar{a}})'$ is the only invalid implication of the form $x_{a\bar{a}} \angle y'_{a\bar{a}}$.

(14) Derive the following implications:

$1 \angle \alpha_{aa}$	$\alpha'_{aa} \angle 0$	$1 \angle \alpha'_{a\bar{a}}$	$\alpha_{a\bar{a}} \angle 0$
$1 \angle \beta'_{aa}$	$\beta_{aa} \angle 0$	$1 \angle \beta'_{a\bar{a}}$	$\beta_{a\bar{a}} \angle 0$
$1 \angle \gamma'_{aa}$	$\gamma_{aa} \angle 0$	$1 \angle \gamma'_{a\bar{a}}$	$\gamma_{a\bar{a}} \angle 0$
$1 \angle \epsilon'_{aa}$	$\epsilon_{aa} \angle 0$	$1 \angle \epsilon_{a\bar{a}}$	$\epsilon'_{a\bar{a}} \angle 0$

$(1 \angle \alpha'_{aa})'$	$(\alpha_{aa} \angle 0)'$	$(1 \angle \alpha_{a\bar{a}})'$	$(\alpha'_{a\bar{a}} \angle 0)'$
$(1 \angle \beta_{aa})'$	$(\beta'_{aa} \angle 0)'$	$(1 \angle \beta_{a\bar{a}})'$	$(\beta'_{a\bar{a}} \angle 0)'$
$(1 \angle \gamma_{aa})'$	$(\gamma'_{aa} \angle 0)'$	$(1 \angle \gamma_{a\bar{a}})'$	$(\gamma'_{a\bar{a}} \angle 0)'$
$(1 \angle \epsilon_{aa})'$	$(\epsilon'_{aa} \angle 0)'$	$(1 \angle \epsilon'_{a\bar{a}})'$	$(\epsilon_{a\bar{a}} \angle 0)'$

Some of the postulates in the text (p. 2) of the form, $(k'_{ab} \angle w_{ab})'$, $(k_{ab} \angle k'_{ab})'$, $(k'_{ab} \angle k_{ab})'$, may be established by

reducing them to one of the forms, $(k'_{aa} \angle w_{aa})'$, $(k'_{a\bar{a}} \angle w_{a\bar{a}})'$ $(k_{aa} \angle k'_{aa})'$, etc., cases already considered in preceding exercises

(15) Establish the invalidity of

$\alpha'_{ab} \angle \beta_{ab}$ $\quad$ $\alpha'_{ab} \angle \gamma_{ab}$ $\quad$ $\gamma'_{ab} \angle \gamma_{ba}$

$\beta'_{ab} \angle \gamma_{ab}$ $\quad$ $\beta'_{ab} \angle \epsilon_{ab}$ $\quad$ $\gamma'_{ab} \angle \epsilon_{ab}$

$\alpha'_{ab} \angle \alpha_{ab}$ $\quad$ $\beta'_{ab} \angle \beta_{ab}$ $\quad$ $\gamma'_{ab} \angle \gamma_{ab}$

$\alpha_{ab} \angle \alpha'_{ab}$ $\quad$ $\epsilon_{ab} \angle \epsilon'_{ab}$ $\quad$ $\epsilon'_{ab} \angle \epsilon_{ab}$

CHAPTER II

§4. At this point in our theory it will be necessary to introduce certain indefinables, which we shall call the distinctions of *better* and *worse*, following a suggestion of Sir William Hamilton's.* For our immediate purpose it will be enough to define *better than* and *worse than* denotatively, establishing an order among the four forms by a simple enumeration. *Better than* and *worse than* are not transitive relations. When we wish to express the rules for the deduction of the moods symbolically, we shall have to invent symbols to represent *worse than* (/), *doubly worse than* (//), and *trebly worse than* (///). This necessity is avoided in the verbal statement of the principles of deduction by the words "in the same degree" (see rule 1 below).

Definitions.—An ϵ-form is worse than an α-, a β-, or a γ-form.

A γ-form is worse than an α- or a β-form.

A β-form is worse than an α-form.

Best. α-- β-- γ-- ϵ *Worst.*

§5. Immediate inference is a form of implication belonging to one of the types:

1. $x_{ab} \angle y_{ab}$. 2. $x_{ab} \angle y_{ba}$.

These differences are known as the first and the second *figures* of immediate inference respectively.

The part to the left of the implication sign is called the *antecedent;* the part to the right is called the *consequent.*

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*Lectures on Logic, Appendix, p. 536.

Since x and y may take on any of the forms, α, β, γ, ϵ, there will be sixteen propositions of each type, obtained from the permutations of the letters two at a time and by taking each letter once with itself. Each one of the sixteen distinct propositions in each one of the two figures is called a *mood* of immediate inference. The rules which follow below, applied to the postulates, will yield all the true and all the false propositions of each type.

Valid Moods.

1. In any valid mood of the first figure make antecedent and consequent worse in the same degree.

2. In any valid mood convert simply in any form but γ.

Postulate: $\alpha_{ab} \angle \alpha_{ab}$. *Theorems:* The other (6) valid moods.

Invalid Moods.

1. In any invalid mood of the first figure make antecedent and consequent worse in the same degree.

2. In any invalid mood of the first figure interchange antecedent and consequent.

3. In any invalid mood convert simply in any form but γ.

*Postulates:**

$\{\alpha_{ab} \angle \beta_{ab}\}'$; $\{\alpha_{ab} \angle \gamma_{ab}\}'$; $\{\alpha_{ab} \angle \epsilon_{ab}\}'$; $\{\gamma_{ab} \angle \gamma_{ba}\}'$.

Theorems: The other (21) invalid moods.

§6. We may also formulate rules for the detection of the invalid moods. These are:

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*The mark (′) over the bracket is intended to indicate that the mood is invalid.

1. If the antecedent be worse than the consequent, the mood is invalid.

2. If the antecedent be better than the consequent, the mood is invalid.

Definition.—Distributed terms are those modified, either implicitly or explicitly, by the adjective *all*, i. e. the subject of the α-, γ- and ϵ-form, and the predicate of the α- and ϵ-form.

3. If a term be distributed in the consequent but undistributed in the antecedent, the mood is invalid.

§7. A syllogism is a form of implication belonging to one of the types:

1. $x_{ba}\, y_{cb} \angle z_{ca} = (x\ y\ z)_1$
2. $x_{ab}\, y_{cb} \angle z_{ca} = (x\ y\ z)_2$
3. $x_{ba}\, y_{bc} \angle z_{ca} = (x\ y\ z)_3$
4. $x_{ab}\, y_{bc} \angle z_{ca} = (x\ y\ z)_4$

These differences are known as the first, second, third, and fourth *figures* of the syllogism respectively. The two forms conjoined in the antecedent are called the *premises* and the consequent is called the *conclusion*. The predicate of the conclusion is called the *major* term and points out the *major* premise, which by convention is written first, and the subject of the conclusion is called the *minor* term and points out the *minor* premise. The term common to both premises and which does not appear in the conclusion is called the *middle* term.

Since x, y and z may have any one of the values, α, β, γ, ϵ, there will be sixty-four ways in each one of the four figures, called the *moods* of the syllogism, in which $x\,y \angle z$ can be expressed. There will be consequently

two hundred and fifty-six cases to consider. Twenty-nine of these are valid implications; the remaining two hundred and twenty-seven are invalid. From the rules and postulates below, all the moods, valid and invalid, may be deduced.

Valid Moods.

1. In any valid mood of the third figure make a like major premise and conclusion worse in the same degree.

2. In any valid mood of the second figure make a like minor premise and conclusion worse in the same degree.

3. In any valid mood convert simply in any form but γ.

Postulates:

$(\alpha\alpha\alpha)_1$
$(\gamma\gamma\gamma)_1$
$(\epsilon\gamma\epsilon)_1$

Theorems:

$(\alpha\alpha\alpha)_{2,3,4}$
$(\alpha\beta\beta)_{1,2,3,4}$
$(\alpha\gamma\gamma)_{1,2}$
$(\alpha\epsilon\epsilon)_{1,2,3,4}$
$(\gamma\epsilon\epsilon)_{2,4}$
$(\beta\alpha\beta)_{1,2,3,4}$
$(\gamma\alpha\gamma)_{1,3}$
$(\epsilon\alpha\epsilon)_{1,2,3,4}$
$(\epsilon\gamma\epsilon)_2$

Invalid Moods.

1. In any invalid mood of the third figure make a like major premise and conclusion better in the same degree.

2. In any invalid mood of the second figure make a like minor premise and conclusion better in the same degree.

3. If the premises and conclusion of an invalid mood in the fourth figure are all alike, make them all worse in the same degree.

4. If the premises and conclusion of an invalid mood are all alike make the conclusion any degree better or any degree worse.

5. If the premises and conclusion of an invalid mood are all unlike, interchange them in any order.

6. In any invalid mood convert simply in any form but γ.

*Postulates:**

$(\alpha\alpha\beta)'_1$ $(\alpha\beta\epsilon)'_1$ $(\beta\gamma\gamma)'_3$ $(\gamma\gamma\gamma)'_2$ $(\epsilon\beta\epsilon)'_1$
$(\alpha\alpha\gamma)'_1$ $(\alpha\gamma\gamma)'_3$ $(\beta\epsilon\gamma)'_1$ $(\gamma\epsilon\gamma)'_2$ $(\epsilon\gamma\gamma)'_3$
$(\alpha\alpha\epsilon)'_1$ $(\alpha\epsilon\gamma)'_1$ $(\gamma\alpha\gamma)'_2$ $(\epsilon\alpha\gamma)'_1$ $(\epsilon\gamma\epsilon)'_3$
$(\alpha\beta\gamma)'_1$ $(\beta\alpha\gamma)'_1$ $(\gamma\beta\gamma)'_2$ $(\epsilon\beta\gamma)'_1$

Theorems:

The other (208) invalid moods.

§8. As in the case of immediate inference we may formulate rules for the detection of the invalid moods of the syllogism. These are five in number.

1. A mood is invalid if the conclusion differ from the worse premise.

2. A mood is invalid if an α- and a γ- premise be conjoined in the antecedent and the middle term be undistributed in the major premise.

3. A mood is invalid if the middle term be undistributed in both premises.

4. A mood is invalid if a term which is distributed in the conclusion be undistributed in the premise.

5. A mood is invalid if each premise be in the ϵ-form.**

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*The mark (′) over the bracket is intended to indicate that the mood is invalid.

**These rules are, of course, not sufficient to declare $(\gamma\epsilon\epsilon)_{2,4}$ and $(\epsilon\gamma\epsilon)_{1,2}$ invalid, in case we decide to so regard them. See the concluding remarks of chap. III.

EXERCISES

If $x_{a,b} \angle y_{a,b}$ be denoted simply by (xy), (the comma between the terms indicating that the term order and so the figure, is not determined), the array of sixteen propositions may be constructed thus:

$\underline{\underline{\alpha\alpha}}$	$\beta\alpha$	$\gamma\alpha$	$\epsilon\alpha$
$\alpha\beta$	$\underline{\underline{\beta\beta}}$	$\gamma\beta$	$\epsilon\beta$
$\alpha\gamma$	$\beta\gamma$	$\underline{\gamma\gamma}$	$\epsilon\gamma$
$\alpha\epsilon$	$\beta\epsilon$	$\gamma\epsilon$	$\underline{\underline{\epsilon\epsilon}}$

the moods valid in both figures being underlined twice, the one valid only in the first figure being underlined once. Applying the first rule to the postulate, we obtain in succession, $\beta\beta$, $\gamma\gamma$, $\epsilon\epsilon$, in the first figure; and converting simply in the consequent of those valid in the first figure, except $\gamma\gamma$, we obtain $\alpha\alpha$, $\beta\beta$, $\epsilon\epsilon$ in the second figure.

(1) From the rules and postulates for the derivation of the invalid moods deduce the remaining twenty-one invalid moods.

The rules for the immediate detection of the invalid moods are all *necessary* if we can point to at least one example which falls uniquely under each rule. They are *sufficient* if they declare all the invalid moods to be invalid.

(2) Construct the set of propositions of immediate inference and place after each invalid mood the number of a rule which declares it to be invalid.

(3) Make a list of moods which are declared invalid by the first rule and by no other rule, and a list of moods which are declared invalid by the second rule and by no other rule.

(4) Find an invalid mood which is declared invalid by the third rule and by no other rule and prove that it is the only unique illustration of this rule.

For those who approach the study of the syllogism for the first time, it may facilitate manipulation to point out the general effect of conversion in the form of certain rules.

1. Simple conversion in the major premise changes the first figure to the second and conversely, the third figure to the fourth and conversely.

2. Simple conversion in the minor premies, changes the first figure to the third and conversely, the second figure to the fourth and conversely.

3. Simple conversion in the conclusion changes the first figure to the fourth and conversely and leaves the second and third figure unchanged.

It must of course not escape the beginner's notice that the effect of converting simply in the conclusion is to interchange the premises, since the major term then becomes the minor term and the minor term becomes the major term. The conjunctive relation of logic being commutative, the order of the premises is indifferent, but we agree, as a matter of convention, always to write the major premise first.

(5) From $(\epsilon\gamma\epsilon)_1$, and the third rule under the valid moods alone, deduce $(\epsilon\gamma\epsilon)_2$, $(\gamma\epsilon\epsilon)_2$ and $(\gamma\epsilon\epsilon)_4$.

(6) From the rules and postulates deduce the remaining valid moods.

(7) Assuming only the third rule under the valid moods and the rule: in any valid mood of the *first* figure make a like major premise and conclusion worse in the same degree, deduce all the remaining valid moods from $(\alpha\alpha\alpha)_1$, $(\gamma\gamma\gamma)_1$ and $(\alpha\gamma\gamma)_1$.

(8) Assuming only the second and third rules under the valid moods deduce the remaining valid moods from $(\alpha\alpha\alpha)_1$, $(\gamma\gamma\gamma)_1$, $(\gamma\alpha\gamma)_1$ and $(\epsilon\gamma\epsilon)_1$.

(9) From $(\epsilon\beta\epsilon)'_1$ alone deduce seventy-eight other invalid moods.

(10) From $(\alpha\beta\epsilon)'_1$ alone deduce twenty-three other invalid moods.

(11) Deduce the invalid moods in the first figure which have a γ-minor premise.

The rules for the immediate detection of the invalid moods are *sufficient*, if they declare all the moods not already found to be valid to be invalid. They are all *necessary* if we can point to at least one example which falls uniquely under each rule.

(12) Construct the array of the syllogism and place after each invalid mood the number of a rule that declares it to be invalid.

(13) Show that it follows from one of the rules alone that two β-premises do not imply a conclusion.

(14) Prove that there are only two moods which illustrate the second rule uniquely.

(15) Make a list of examples which fall uniquely under each one of the rules.

CHAPTER III

§9. In this third chapter it is proposed to completely define the relationships of *better* and *worse* by deducing all the true and all the false propositions into which these relationships may enter and then to give a complete expression in the language of symbols of the rules for the deduction of the moods of immediate inference and the syllogism.

§10. Let us, first of all, invent symbols to denote *worse than*, *doubly worse than*, and *trebly worse than*, i. e.

x / y = x is worse than y,
x // y = x is doubly worse than y,
x /// y = x is trebly worse than y,

and let us add the following:

Definition.—In the propositions, x / y, x // y, and x /// y, x is called the *inferior*, y the *superior* form.

Since x and y may take on any of the four forms $\alpha, \beta, \gamma, \epsilon$, there will be sixteen possible propositions of each type, x / y, x // y and x /// y, obtained by permuting the letters two at a time and by taking each letter once with itself. The following postulates and principles will yield all the valid moods of each type. We have assumed four principles here because the principles for the deduction of the invalid moods may be derived from these four as theorems.

Principles:

i. (x / y) (y // z) ∠ (x /// z)
ii. (x / y) (z // x) ∠ (z /// y)
iii. (x / z) (y /// z) ∠ (y // x)
iv. (x / z) (y // z) ∠ (y / x)

Postulates: β / α; ϵ / γ; γ // α.

Theorems: γ / β; ϵ // β; ϵ /// α.

We may also formulate rules for the derivation of the moods. It will then be necessary to assume one postulate only.

Definition:—In the propositions, x / y, x // y and x///y, the relation connecting x and y is known as the *worse-relation.*

Definition:—Trebly worse (///) is worse than *doubly worse* (//) and doubly worse than *worse* (/). *Doubly worse* (//) is worse than *worse* (/).

The rules are:

1. In any valid mood make superior and inferior form one degree better or one degree worse.

2. In any valid mood make inferior form and worse-relation one degree better or one degree worse.

Postulate:	*Theorems:*
β / α.	The other (5) valid moods.

The invalid moods of each type may be derived from the following postulates and principles:

*Principles:**

i. $(x / y)\ (x///z)' \angle (y // z)'$
$(x///z)'\ (y // z) \angle (x / y)'$

ii. $(x / y)\ (z///y)' \angle (z // x)'$
$(z///y)'\ (z // x) \angle (x / y)'$

iii. $(x / z)\ (y // x)' \angle (y///z)'$
$(y // x)'\ (y///z) \angle (x / z)'$

iv. $(x / z)\ (y / x)' \angle (y // z)'$
$(y / x)'\ (y // z) \angle (x / z)'$

---

*These principles follow from those used for the deduction of the valid moods by $(xy \angle z) \angle (xz' \angle y')$.

Postulates:	*Theorems:*
$(\alpha///\epsilon)'$; $(\beta///\epsilon)'$; $(\gamma///\epsilon)'$; $(\epsilon///\epsilon)'$; $(\epsilon///\gamma)'$; $(\epsilon///\beta)'$.	The other (36) invalid moods.

As in the case of the valid moods, rules may be formulated for the derivation of the invalid moods. Here it will be necessary to assume only three postulates. The rules are:

1. In any invalid mood make superior and inferior form one degree better or one degree worse.
2. In any invalid mood make inferior form and worse-relation one degree better or one degree worse.
3. In any invalid mood make superior form three degrees worse.

Postulates:	*Theorems:*
$(\alpha\ /\ \gamma)'$; $(\gamma\ /\ \alpha)'$; $(\epsilon\ /\ \alpha)'$.	The other (39) invalid moods.

§11. Having now completely defined the relationships of *better* and *worse* by deducing all the propositional forms into which these relationships may enter, there remains for this chapter only one other task, which is to deduce symbolically the moods of immediate inference and the syllogism.

§12. From the postulates and principles, which are given below, all the moods, valid and invalid, of immediate inference may be deduced.

Principles:

i. $(y\ /\ x)\ (x_{a\,b} \angle x_{a\,b}) \angle (y_{a\,b} \angle y_{a\,b})$.
iv. $(x \angle y)\ (y \angle z) \angle (x \angle z)$.

Postulates:	*Theorems:*
$\alpha_{ab} \angle \alpha_{ba}$; $\beta_{ab} \angle \beta_{ba}$; $\epsilon_{ab} \angle \epsilon_{ba}$.	The other valid moods.

*Principles:**

ii. $(x\ /\ y)\ (x_{a\,b} \angle x_{a\,b}) \angle (x_{a\,b} \angle y_{a\,b})'$
$(x//y)\ (x_{a\,b} \angle x_{a\,b}) \angle (x_{a\,b} \angle y_{a\,b})'$

iii. $(y\ /\ x)\ (x_{a\,b} \angle x_{a\,b}) \angle (x_{a\,b} \angle y_{a\,b})'$
$(y//x)\ (x_{a\,b} \angle x_{a\,b}) \angle (x_{a\,b} \angle y_{a\,b})'$

v. $(x \angle y)\ (x \angle z)' \angle (y \angle z)'$
$(x \angle z)'\ (y \angle z) \angle (x \angle y)'$

Postulates:

$(\alpha_{ab} \angle \epsilon_{ab})'$; $(\epsilon_{ab} \angle \alpha_{ab})'$; $(\gamma_{ab} \angle \gamma_{ba})'$.

Theorems:

The other invalid moods.

§13. All the valid and invalid moods of the syllogism may be deduced from the assumptions which follow. The right to convert simply in any form but γ is expressed under v and vi. It will be evident that some of the postulates might have been saved at the expense of introducing new principles, and conversely. The first two principles for the deduction of the invalid moods under iv are theorems from the ones that have gone before under i, by $(xy \angle z) \angle (xz' \angle y')$.

Principles:

i. $(y\ /\ x)\ (x_{ba}\, z_{bc} \angle x_{ca}) \angle (y_{ba}\, z_{bc} \angle y_{ca})$
$(y\ /\ x)\ (z_{ab}\, x_{cb} \angle x_{ca}) \angle (z_{ab}\, y_{cb} \angle y_{ca})$

v. $(xy \angle z)\ (z \angle w) \angle (xy \angle w)$
$(xy \angle z)\ (w \angle x) \angle (wy \angle z)$
$(xy \angle z)\ (w \angle y) \angle (xw \angle z)$

---

*These principles, except the second under iii are really special cases of principles i and iii under the syllogism, obtained from the latter by making b=c, the primed part of the antecedent in iii becoming unprimed in the special case.

Postulates: $(\alpha\alpha\alpha)_1$; $(\gamma\gamma\gamma)_1$; $(\epsilon\gamma\epsilon)_1$.
Theorems: The other (26) valid moods.

Principles:

ii. $(y / x)(z / y)(xy \angle z)' \angle (xz \angle y)'$
$(y / x)(z // y)(xy \angle z)' \angle (xz \angle y)'$
$(y // x)(y / z)(xy \angle z)' \angle (xz \angle y)'$
$(y /// x)(y / z)(xy \angle z)' \angle (xz \angle y)'$
$(y / x)(z / y)(xy \angle z)' \angle (zy \angle x)'$
$(y / x)(z // y)(xy \angle z)' \angle (zy \angle x)'$
$(y // x)(y / z)(xy \angle z)' \angle (zy \angle x)'$
$(y /// x)(y / z)(xy \angle z)' \angle (zy \angle x)'$.

iii. $(x / y)(x_{a,b}\, x_{b,c} \angle x_{ca})' \angle (x_{a,b}\, x_{b,c} \angle y_{ca})'$
$(x // y)(x_{a,b}\, x_{b,c} \angle x_{ca})' \angle (x_{a,b}\, x_{b,c} \angle y_{ca})'$
$(y / x)(x_{a,b}\, x_{b,c} \angle x_{ca})' \angle (x_{a,b}\, x_{b,c} \angle y_{ca})'$

iv. $(x / z)(y_{ab}\, x_{cb} \angle x_{ca})' \angle (y_{ab}\, z_{cb} \angle z_{ca})'$
$(x / z)(x_{ba}\, y_{bc} \angle x_{ca})' \angle (z_{ba}\, y_{bc} \angle z_{ca})'$
$(y / x)(x_{ab}\, x_{bc} \angle x_{ca})' \angle (y_{ab}\, y_{bc} \angle y_{ca})'$

vi.* $(xy \angle z)'\,(w \angle z) \angle (xy \angle w)'$
$(xy \angle z)'\,(x \angle w) \angle (wy \angle z)'$
$(xy \angle z)'\,(y \angle w) \angle (xw \angle z)'$

Postulates:

$(\alpha\alpha\beta)'_1$ $(\alpha\beta\gamma)'_1$ $(\alpha\epsilon\gamma)'_1$ $(\beta\gamma\gamma)'_3$ $(\gamma\beta\gamma)'_2$ $(\epsilon\alpha\gamma)'_1$ $(\epsilon\gamma\gamma)'_3$
$(\alpha\alpha\gamma)'_1$ $(\alpha\beta\epsilon)'_1$ $(\beta\alpha\gamma)'_1$ $(\beta\epsilon\gamma)'_1$ $(\gamma\gamma\gamma)'_2$ $(\epsilon\beta\gamma)'_1$ $(\epsilon\gamma\epsilon)'_3$
$(\alpha\alpha\epsilon)'_1$ $(\alpha\gamma\gamma)'_3$ $(\beta\beta\epsilon)'_1$ $(\gamma\alpha\gamma)'_2$ $(\gamma\epsilon\gamma)'_2$ $(\epsilon\beta\epsilon)'_1$ $(\epsilon\epsilon\alpha)'_1$

Theorems:

The other (206) invalid moods.

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*Principles v and vi are of course not independent. The first under v is a variation of transitivity, the third a variation of the second by $xy \angle yx$. Those under vi follow from those under v by $(xy \angle z) \angle (xz' \angle y')$. Principles v under immediate inference follow from transitivity by the same principle.

§14. We have already pointed out, (note p. 2), that the product $\gamma_{a,b}\ \epsilon_{a,b}$ does not vanish in general if we allow the possibility of the limiting values 0 and 1 for the terms. Under these conditions, $(\gamma\,\epsilon\,\epsilon)_{2,4}$ and $(\epsilon\gamma\,\epsilon)_{1,2}$ are not valid moods of the syllogism, for they become $\gamma_{01}\ \epsilon_{0,1} \angle 0$, for $a=c=0$ and $b=1$. A logic, which recognizes these limiting values of the terms, will have to postulate $(\epsilon\gamma\,\epsilon)'_1$, say, which yields, $(\epsilon\gamma\,\epsilon)'_2$ and $(\gamma\,\epsilon\,\epsilon)'_{2,4}$.

The only change, which we should then have to make in chapters II and III, would be to replace $(\gamma\gamma\gamma)'_2$ among the postulates by $(\epsilon\gamma\,\epsilon)'_1$, from which $(\gamma\gamma\gamma)'_2$ follows as a theorem, and to subtract $(\epsilon\gamma\,\epsilon)_{1,2}$ and $(\gamma\,\epsilon\,\epsilon)_{2,4}$ from the list of valid moods.

This logic, which might be called non-Aristotelian, or semi-Aristotelian, or imaginary logic, is more general than the ordinary or classical logic and includes the latter as a special case, becoming, in fact, identical with it when the field of its application is narrowed so as to exclude "nothing" and "universe" as limiting values of the terms. One principle, which is true in the special, but not in the general case, is:

$$(y\ /\ x)\ (x_{ba}\ z_{cb} \angle x_{ca}) \angle (y_{ba}\ z_{cb} \angle y_{ca}),$$

and this principle may be regarded as the differentiating character of the two cases. If we had chosen to assume it, instead of the first principle under i, we could have saved the third postulate, but the second principle under iv would not then have followed as a theorem.

The definitions of chapter I, §3, hold for both cases; the only change to be made in implications V in order to make them true in the more general logic, will be to replace $\gamma_{a\bar{a}}=0$ by $\gamma_{a\bar{a}} \neq 0$, and this property has not been made use of in defining the γ-form.

The Aristotelian forms, A, E, I, O, (see Appendix I), will yield only eight valid moods of the syllogism, under the new condition, instead of the twenty-four valid moods commonly recognized. They satisfy all the conditions of maximum simplicity in the special or classical instance—they are the best possible forms to choose for the construction of an Aristotelian logic—but they fail in the general instance, for they then lose their peculiar advantage, that, corresponding to any member of the set there should be another member of the set which represents its contradictory.

EXERCISES

By the aid of the principles,

$(xy \angle z)\ (z \angle w) \angle (xy \angle w)$
$(xy \angle z)\ (w \angle x) \angle (wy \angle z)$
$(xy \angle z)\ (w \angle y) \angle (xw \angle z)$

we are enabled to convert in either premise or the conclusion. The example which follows will illustrate the method.

$$(\gamma_{ba}\, \alpha_{cb} \angle \gamma_{ca})\ (\alpha_{ab} \angle \alpha_{bc}) \angle (\gamma_{ba}\, \alpha_{bc} \angle \gamma_{ca})$$

(1) From $(\epsilon\gamma\epsilon)_1$ derive $(\gamma\,\epsilon\,\epsilon)_{2,4}$.

(2) From the principles and the postulates in the text deduce the remaining valid moods.

(3) From the postulates, $(\alpha\alpha\alpha)_1$, $(\gamma\gamma\gamma)_1$, $(\alpha\gamma\gamma)_1$ and the principle $(y/x)\ (x_{ba}\, z_{cb} \angle x_{ca}) \angle (y_{ba}\, z_{cb} \angle y_{ca})$ deduce the remaining valid moods.

If we identify the subject and predicate of the conclusion in the mood, $(\beta\alpha\beta)_3$, we obtain $\beta_{ba}\, \alpha_{ba} \angle 0$, (chapter I, implications v). By the aid of $(xy \angle 0) \angle (x \angle y')$ it follows that $\alpha_{ab} \angle \beta'_{ab}$.

(4) Deduce as many as possible of the propositions of the form, $x_{ab} \angle y'_{ab}$, (chapter I, p. 2) by identifying subject and predicate in the conclusion of the valid moods of the syllogism.

The principles,

$(xy \angle z)'\ (w \angle z) \angle (wy \angle w)'$
$(xy \angle z)'\ (x \angle w) \angle (wy \angle z)'$
$(xy \angle z)'\ (y \angle w) \angle (xw \angle z)'$

enable us to convert in either premise or the conclusion.

(5) From $(\beta\beta\beta)'_1$, derive the invalidity of this mood in the other figures.

(6) From $(\epsilon\beta\epsilon)'_1$ alone and principles iii, iv and vi deduce seventy other invalid moods.

(7) From $(\alpha\beta\gamma)'_1$ alone and principles ii deduce nineteen other invalid moods.

(8) Deduce the invalid moods in the third figure, whose conclusion is in the γ-form.

(9) Deduce the invalid moods in the fourth figure, whose major premise is in the γ-form.

(10) From $\gamma\gamma\gamma_1$ alone, deduce forty-six valid implications of the form $L_{a,b}\, M_{b,c} \angle N'_{ca}$,—L, M and N representing only the unprimed letters.

(11) Assuming $\epsilon\gamma\epsilon_{1,2}$ and $\gamma\epsilon\epsilon_{2,4}$ to be invalid, show that $\gamma\gamma\gamma_1$ yields only thirteen valid implications of the form given in the last exercise.

(12) Assuming $(\beta\beta\beta')'_1\ (\beta\beta\gamma')'_1\ (\beta\beta\epsilon')'_1\ (\gamma\gamma\beta')'_2\ (\gamma\gamma\beta')'_3\ (\gamma\gamma\gamma')'_1\ (\gamma\gamma\epsilon')'_2\ (\epsilon\gamma\beta')'_3\ (\epsilon\gamma\epsilon')'_3\ (\epsilon\epsilon\beta')'_1\ (\epsilon\epsilon\epsilon')'_1$
deduce sixty-nine other non-implications of the same form.

Any non-implication of the form, $L_{b,a}\, M_{c,b} \angle N'_{ca}$, which contains an α-form may be proven invalid by identifying terms in the α-form. Thus $\beta_{ba}\,\beta_{bc} \angle \alpha'_{ca}$ reduces to $\beta_{ba} \angle \beta'_{ba}$ for $c=a$; $\gamma_{ba}\,\alpha_{cb} \angle \gamma'_{ca}$ reduces to $\gamma_{ba} \angle \gamma'_{ba}$ for $c=b$, etc.

(13) Establish the invalidity of the thirty-four non-implications of the form $L_{b,a}\, M_{a,b} \angle N'_{ca}$ not accounted for in the preceding exercise.

(14) Show that there are thirty-six, and only thirty-six, distinct valid implications of the form $L_{a,b}\, M_{b,c}\, N_{c,a} \angle 0$,—L, M and N representing only the unprimed letters, α, β, γ, ϵ.

(15) Derive indirectly the $(\gamma\gamma\gamma')'_1$ of exercise 12.

A certain number of the postulates for the derivation of the invalid moods of the syllogism (p. 21) may be shown indirectly to be invalid by reducing them to invalid moods of immediate inference. Thus $(\alpha\alpha\beta)_1$ reduces to $\alpha_{ab} \angle \alpha'_{ab}$ when the terms in the conclusion are identified, and $(\alpha\beta\gamma)_1$ reduces to $\beta_{ca} \angle \gamma_{ca}$ when we identify terms in the major premise and suppress the part α_{aa} (see chap. IV).

(16) Establish the invalidity of

$(\alpha\alpha\gamma)_1$	$(\alpha\alpha\epsilon)_1$	$(\beta\beta\epsilon)_1$
$(\alpha\beta\epsilon)_1$	$(\alpha\epsilon\gamma)_1$	$(\beta\alpha\gamma)_1$
$(\epsilon\alpha\gamma)_1$	$(\alpha\gamma\gamma)_3$	$(\gamma\alpha\gamma)_2$

Most of the other postulates for the deduction of the invalid moods of the syllogism may be reduced by the method of the following example:

Suppose that $(\epsilon\beta\gamma)_1$ is valid. Now $(\epsilon\beta\gamma')_1$ is valid by a preceding exercise.

$\therefore (\epsilon_{ba}\,\beta_{cb} \angle \gamma_{ca})\ (\epsilon_{ba}\,\beta_{cb} \angle \gamma'_{ca}) \angle (\epsilon_{ba}\,\beta_{cb} \angle 0)$
since $(x \angle y)\ (x \angle y') \angle (x \angle 0)$.

Consequently $\epsilon_{ba}\,\beta_{cb} \angle \epsilon_{ca}$.

If now we postulate $(\epsilon\beta\epsilon)'_1$, it follows that $(\epsilon\beta\gamma)'_1$.

(17) Establish the invalidity of

$(\beta\gamma\gamma)_3$ $(\gamma\beta\gamma)_2$ $(\gamma\gamma\gamma)_4$
$(\gamma\epsilon\gamma)_2$ $(\epsilon\gamma\gamma)_3$ $(\epsilon\epsilon\alpha)_1$

The postulates $(\beta\epsilon\gamma)'_1$ $(\epsilon\beta\epsilon)'_1$ and $(\epsilon\gamma\epsilon)'_3$ that remain (p. 21) may be reduced by the following method:

$(\beta_{ba}\,\beta_{cb} \angle \epsilon'_{ca})'\ (\beta_{cb} \angle \gamma'_{cb}) \angle (\beta_{ba}\,\gamma'_{cb} \angle \epsilon'_{ca})'$

by a principle under vi and the postulate of a preceding exercise

$(\beta_{ba}\,\gamma'_{cb} \angle \epsilon'_{ca})' \angle (\beta_{ba}\,\epsilon_{ca} \angle \gamma_{cb})'$

which yields $(\beta\epsilon\gamma)'_1$ by simple conversion in the major premise.

(18) Establish the invalidity of $(\epsilon\beta\epsilon)_1$ and $(\epsilon\gamma\epsilon)_3$.

Any non-implication of the form $L_{a,b}\ M_{b,c} \angle N_{ca}$, which contains an α-premise, may be reduced to an invalid mood of immediate inference, and so shown to be invalid, by identifying terms in the α-premise. All of the other invalid moods may be derived from the postulates of exercise (12), the forms of immediate implication given in chapter I, the principles iv and vi of chapter III, together with $(xy \angle z) \angle (xz' \angle y')$ and $(xy \angle z) \angle (z'y \angle x')$.

19. From the postulates of exercise (12) deduce all the non-implications of the form $L_{a,b}\ M_{b,c} \angle N_{ca}$, without making use of principles ii and iii of this chapter.

20. Show that there exist no valid implications of the form $L'_{a,b}\ M_{b,c} \angle N_{ca}$ or $L_{a,b}\ M'_{b,c} \angle N_{ca}$ and consequently none of the form $L'_{a,b}\ M'_{b,c} \angle N_{ca}$ or $L'_{a,b}\ M'_{b,c} \angle N'_{ca}$.

CHAPTER IV

§15. The sorites is a form of implication of the general type:*

$$x_1(1,2)\ x_2(2,3)\ x_3(3,4)\text{---}\ x_{n-1}(\overline{n-1},\ n) \angle x_n(n\ 1),$$

in which the number of terms is greater than three.

Certain valid moods of the sorites can be constructed from chains of valid syllogisms. Thus the chain of syllogisms:

$$a(1,2)\ a(2,3) \angle a(31),$$
$$a(31)\ a(3,4) \angle a(41),$$
$$a(41)\ a(4,5) \angle a(51),$$

will yield a valid sorites, viz:

$a(1,2)\ a(2,3)\ a(3,4)\ a(4,5) \angle a(51)$, for
$\{\, a(1,2)\ a(2,3) \angle a(31)\,\} \angle \{\, a(1,2)\ a(2,3)\ a(3,4) \angle a(31)\ a(3,4)\,\}$
$\therefore$ $a(1,2)\ a(2,3)\ a(3,4) \angle a(41)$, by the second syllogism and the principle of transitivity.

$$\{\, a(1,2)\ a(2,3)\ a(3,4) \angle a(41)\,\} \angle$$
$$\{\, a(1,2)\ a(2,3)\ a(3,4)\ a(4,5) \angle a(41)\ a(4,5)\,\}$$
$\therefore$ $a(1,2)\ a(2,3)\ a(3,4)\ a(4,5) \angle a(51)$, as before.

Consequently in general, if

$$x_1(1,2)\ x_2(2,3) \angle x_3(31)$$
$$x_3(31)\ x_4(3,4) \angle x_5(41)$$
$$x_5(41)\ x_6(4,5) \angle x_7(51)$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$x_{2n-5}(\overline{n-1\ 1})\ x_{2n-4}(\overline{n-1},\ n) \angle x_{2n-3}(n1)$$

---

*In this chapter it will be more convenient to employ the notation $x(ab)$ for x_{ab} or $x(1,2)$ for $x_{1,2}$. The comma between the terms means that the term order is not settled.

be a chain of valid syllogisms, then

$$x_1(1,2)\ x_2(2,3)\ x_4(3,4)\text{---}\ x_{2n-4}(\overline{n-1},\ n) \angle x_{2n-3}(n1)$$

is a valid mood of the sorites. It remains to be proven that the only valid moods that exist can be constructed from chains of valid syllogisms. The proof depends on the following principles.

Principle i.—A valid mood of the sorites, which has one premise of the same form as the conclusion, will remain valid, when as many of the other premises as we desire are put in the a-form.

Principle ii.—A valid mood of the sorites will remain valid, when as many terms have been identified as we desire.

Principle iii.—An a-premise, whose subject and predicate are identical, may be suppressed as a unit multiplier.

Principle iv.—A valid mood of the sorites, none of whose premises has the same form as the conclusion, will remain valid, when as many premises as we desire are put in the a-form.

Theorem i.—There exists no valid mood of the sorites, in which none of the premises has the same form as the conclusion.

For (principle iv) put all the premises after the first in the a-form. Then by identifying terms (principle ii) the mood of the sorites can be reduced (principle iii) to an invalid syllogism of the form:

$$x_1(1,2)\ a(2,3) \angle x_n(31).$$

Conclusion in the a-form.

At least one of the premises is in the a-form (theorem i). If one of the remaining premises, $x_r(\overline{s-1},\ s)$, be not in the a-form, put each one of the other premises in the a-form,

if all but x_r be not already in that form (principle i). Then by identifying terms (principle ii) the mood of the sorites will reduce (principle iii) to an invalid syllogism of the form:

$$x_r(\overline{s-1}, s)\ \alpha(s, \overline{s+1}) \angle \alpha(\overline{s+1}\ \overline{s-1}),$$
$$\text{or } \alpha(\overline{s-2}, \overline{s-1})\ x_r(\overline{s-1}, s) \angle \alpha(s\ \overline{s-2}).$$

Consequently all the premises are in the α-form if the mood of the sorites is valid and the sorites is of the general type:

$$\alpha(1,2)\ \alpha(2,3)\text{---}\ \alpha(\overline{n-1}, n) \angle \alpha(n1),$$

which can be constructed from the chain of valid syllogisms:

$$\alpha(2,1)\ \alpha(3,2) \angle \alpha(31),$$
$$\alpha(31)\ \alpha(4,3) \angle \alpha(41),$$
$$\alpha(41)\ \alpha(5,4) \angle \alpha(51),$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\alpha(\overline{n-1}\ 1)\ \alpha(n, \overline{n-1}) \angle \alpha(n\ 1).$$

Conclusion in the β-form.

At least one premise, x_t, is in the β-form (theorem i), and all the other premises are in the α-form. For suppose one of the other premises $x_r(\overline{s-1}, s)$ were not in the α-form. Put all the premises (principle i) except x_t and x_r in the α-form. Then by identifying terms (principle ii) the mood of the sorites will be reducible to an invalid syllogism (principle iii) of the form:

$$\beta(\overline{s-1}, \overline{s-2})\ x_r(s, \overline{s-1}) \angle \beta(s\ \overline{s-2}),$$
$$\text{or } x_r(s, \overline{s-1})\ \beta(s, \overline{s+1}) \angle \beta(\overline{s+1}\ \overline{s-1}).$$

Consequently the sorites must be of the form:

$$\alpha(1,2)\ \alpha(2,3)\text{ --- }\alpha(s, \overline{s-1})\ \beta(\overline{s+1}, s)\ \alpha(\overline{s+1}, \overline{s+2})\text{---}\alpha(\overline{n-1}, n)$$

$\angle\ \beta(n\ 1)$, which can be constructed from the chain of syllogisms:

$$\alpha(1,2)\ \alpha(2,3) \angle \alpha(31)$$
$$\alpha(31)\ \alpha(3,4) \angle \alpha(41)$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\alpha(\overline{s-1}\ 1)\ \alpha(\overline{s-1},\ s) \angle \alpha(s\ 1)$$
$$\alpha(s\ 1)\ \beta(s,\ \overline{s+1}) \angle \beta(\overline{s+1}\ 1)$$
$$\beta(\overline{s+1}\ 1)\ \alpha(\overline{s+1},\ \overline{s+2}) \angle \beta(\overline{s+2}\ 1)$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\beta(\overline{n-1}\ 1)\ \alpha(\overline{n-1},\ n) \angle \beta(n\ 1).$$

Conclusion in the γ-form.

At least one of the premises is in the γ-form (theorem i). Each γ-form in the antecedent must present its terms in the order $(s\ \overline{s-1})$. For suppose that $\gamma(\overline{s-1}\ s)$ should appear as one of the premises. Put each one of the remaining premises in the α-form (principle i). Then by identifying terms (principle ii) the sorites will reduce to an invalid syllogism (principle iii) of the form:

$$\gamma(\overline{s-1}\ s)\ \alpha(s,\ \overline{s+1}) \angle \gamma(\overline{s+1}\ \overline{s-1}),$$
or $$\alpha(\overline{s-1},\ \overline{s-2})\ \gamma(\overline{s-1}\ s) \angle \gamma(s\ \overline{s-2}).$$

Pursuing the same reasoning as before it can be shown that no β- or ϵ- premises can occur. One form of this sorites may consequently be $\gamma(21)$--$\gamma(n\ \overline{n-1}) \angle \gamma(n1)$, which can, in fact, be constructed from the chain of valid syllogisms:

$$\gamma(21)\ \gamma(32) \angle \gamma(31)$$
$$\gamma(31)\ \gamma(43) \angle \gamma(41)$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\gamma(\overline{n-1}\ 1)\ \gamma(n\ \overline{n-1}) \angle \gamma(n\ 1).$$

All the other forms of valid sorites with a γ-conclusion are obtained from the above type by transforming one or

more of the premises into the α-form in every possible way under the restrictions of theorem i. Each one of these types can be built up from a chain of valid syllogisms each member of which has one of the forms:

$$(\gamma\gamma\gamma)_{1},\ (\alpha\gamma\gamma)_{1,2},\ \text{or}\ (\gamma\alpha\gamma)_{1,3}.$$

Conclusion in the ϵ-form.

At least one of the premises is in the ϵ-form (theorem i), and there is not more than one ϵ-premise. For, if there are two or more ϵ-premises, put all the premises but two of the ϵ-premises in the α-form (principle i). Then by identifying terms (principle ii) we will come upon an invalid syllogism (principle iii) of the form:

$$\epsilon(\overline{s-1},\ s)\ \ \epsilon(s,\ \overline{s+1}) \angle\ \epsilon(\overline{s+1}\ \ \overline{s-1}).$$

There can be present no β-premise. For suppose $x_r\ (s,\ \overline{s-1})$ to be a β-premise. Put all the premises except x_r and the ϵ-premise in the α-form (principle i). By identifying terms (principle ii) we will come upon an invalid syllogism (principle iii) of the form:

$$\beta(s,\ \overline{s-1})\ \ \epsilon(s,\ \overline{s+1}) \angle \epsilon(\overline{s+1}\ \ \overline{s-1}),$$

or

$$\epsilon(\overline{s-1},\ \overline{s-2})\ \ \beta(s,\ \overline{s-1}) \angle\ \epsilon(s\ \overline{s-2}).$$

Any γ-premise coming after the ϵ-premise must present its terms in the order $(s\ \overline{s-1})$. For suppose $\gamma(s,\ \overline{s-1})$ coming after the ϵ-premise to present the term order $(\overline{s-1}\ s)$. Put all the premises except $\gamma(\overline{s-1}\ s)$ and the ϵ-premise in the α-form (principle i). Then by identifying terms (principle ii) we will come upon an invalid syllogism (principle iii) of the form:

$$\epsilon(\overline{s-1},\ \overline{s-2})\ \ \gamma(\overline{s-1}\ s) \angle\ \epsilon(s\ \overline{s-2}).$$

Any γ-premise coming before the ϵ-premise must present its terms in the order $(\overline{s-1}\ s)$. For suppose $\gamma(s,\ \overline{s-1})$

coming before the ϵ-premise to present the term order $(s\ \overline{s-1})$. Put all the premises except $\gamma(s\ \overline{s-1})$ and the ϵ-premise in the α-form (principle i). Then by identifying terms (principle ii) we will come upon an invalid syllogism (principle iii) of the form:

$$\gamma(s\ \overline{s-1})\ \epsilon(s,\ \overline{s+1}) \angle\ \epsilon(\overline{s+1}\ \overline{s-1}).$$

One form of this sorites may be, consequently,

$\gamma(12)\quad \gamma(23)\text{---}\gamma(\overline{s-2}\ \overline{s-1})\quad \epsilon(s,\ \overline{s-1})\quad \gamma(\overline{s+1}\ s)\text{---}\gamma(n\ \overline{n-1}) \angle\ \epsilon(n\ 1)$, which can, in fact, be constructed from the chain of valid syllogisms:

$$\gamma(12)\ \gamma(23) \angle\ \gamma(13)$$
$$\gamma(13)\ \gamma(34) \angle\ \gamma(14)$$
$$\cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot$$
$$\gamma(1\ \overline{s-2})\ \gamma(\overline{s-2}\ \overline{s-1}) \angle\ \gamma(1\ \overline{s-1})$$
$$\gamma(1\ \overline{s-1})\ \epsilon(s,\ \overline{s-1}) \angle\ \epsilon(s\ 1)$$
$$\epsilon(s\ 1)\ \gamma(\overline{s+1}\ s) \angle\ \epsilon(\overline{s+1}\ 1)$$
$$\cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot\quad \cdot$$
$$\epsilon(\overline{n-1}\ 1)\ \gamma(n\ \overline{n-1}) \angle\ \epsilon(n\ 1)$$

All the other forms of valid sorites with an ϵ-conclusion are obtained from the above type by replacing one or more of the γ-forms by α-forms in every possible way. Each new type can be constructed from a chain of valid syllogisms, each member of which has one of the forms:

$$(\alpha\,\epsilon\,\epsilon)_{1,2,3,4},\ (\epsilon\alpha\,\epsilon)_{1,2,3,4},\ (\gamma\,\epsilon\,\epsilon)_{2,4},\ (\epsilon\gamma\,\epsilon)_{1,2}.$$

There exist, consequently, no valid moods of the sorites which can not be constructed from chains of valid syllogisms.*

---

*If $(\gamma\,\epsilon\,\epsilon)_{2,4}$ and $(\epsilon\gamma\,\epsilon)_{1,2}$ are to be regarded as invalid moods, (see the concluding remarks of chapter III), then it can be shown at once that no γ-premise can occur when the conclusion is in the ϵ-form. The general form of such a sorites will be,

EXERCISES

(1) Construct a valid sorites from the chain of valid syllogisms:

$$\alpha_{21}\,\gamma_{32} \angle \gamma_{31},$$
$$\gamma_{31}\,\alpha_{43} \angle \gamma_{41},$$
$$\gamma_{41}\,\gamma_{54} \angle \gamma_{51}.$$

(2) By the aid of the principles of chapter IV, reduce the valid sorites, $\alpha_{21}\,\gamma_{32}\,\alpha_{43}\,\gamma_{54} \angle \gamma_{51}$, successively to each one of the three valid syllogisms of example 1.

(3) Prove the invalidity of the sorites,

$$\gamma_{21}\,\gamma_{32}\,\gamma_{34}\,\gamma_{54} \angle \gamma_{51}.$$

(4) From what chain of valid syllogisms can the sorites, $\alpha_{1,2}\,\gamma_{23}\,\epsilon_{3,4}\,\gamma_{54}\,\alpha_{6,5} \angle \epsilon_{61}$ be constructed?

(5) If $(\epsilon\gamma\epsilon)_{1,2}$ and $(\gamma\,\epsilon\,\epsilon)_{2,4}$ be regarded as invalid moods of the syllogism, (see the concluding remarks of chap. III), prove the invalidity of the sorites,

$$\gamma_{12}\,\gamma_{23}\cdots\gamma_{s-2\,s-1}\;\epsilon_{s,\,s-1}\,\gamma_{s+1\,s}\cdots\gamma_{n\,n-1} \angle \epsilon_{n1}$$

$\alpha(1,2)\,\alpha(2,3)\cdots\alpha(\overline{s-1},\,s)\,\epsilon\,(s,\,\overline{s+1})\,\alpha\,(\overline{s+1},\,\overline{s+2})\cdots\alpha\,(\overline{n-1},\,n) \angle \epsilon(n1)$

which can be built up from the chain of syllogisms,

$\alpha(1,2)\alpha(2,3) \angle \alpha(31)$

$\alpha(31)\alpha(3,4) \angle \alpha(41)$

. . . . . .

$\alpha(\overline{s-1}\;1)\alpha(\overline{s-1},\,s) \angle \alpha(s1)$

$\alpha(s1)\,\epsilon\,(s,\,\overline{s+1}) \angle \epsilon(\overline{s+1}\;1)$

$\epsilon\,(\overline{s+1}\;1)\,\alpha\,(\overline{s+1},\,\overline{s+2}) \angle \epsilon\,(\overline{s+2}\;1)$

. . . . . .

$\epsilon(\overline{n-1}\;1)\,\alpha(\overline{n-1},\,n) \angle \epsilon\,(n\;1)$

APPENDIX I

On the Simplification of Categorical Expression and the Reduction of the Syllogistic Figures

If a and b represent classes, there are four ways in which they may be related categorically, the one standing for subject, the other for predicate. These four forms of relationship are always represented by the letters, A, E, I, O, i. e.

A_{ab} = all a is b,
E_{ab} = no a is b,
I_{ab} = some a is b,
O_{ab} = not all a is b.

Historical efforts have been made to reduce the number of these relationships. If symbols be invented to denote *some* a (ă) and not-a (a_1), the last three may be represented by means of the first, for:

$$E_{ab} = A_{ab1},\ I_{ab} = A_{\breve{a}b},\ O_{ab} = A_{\breve{a}b1}.$$

But an essential difference is here left undistinguished and the number of necessary forms will not have been reduced by this device. If a new symbol be employed for *all* a (ā) and another for the copula *is* ($\angle$), we shall have:

$A_{ab} = \bar{a} \angle \breve{b}$,
$E_{ab} = \bar{a} \angle \breve{b}_1$,
$I_{ab} = \breve{a} \angle \breve{b}$,
$O_{ab} = \breve{a} \angle \breve{b}_1$.

The four separate categorical forms have, accordingly, been gotten rid of at the cost of introducing four new undefined symbols, so that no economy of our indefinables has been effected.

It is to be observed that the word *some*, which is implicit or explicit in the meaning of part of each proposition, means *some at least, possibly all.* Another set of propositions, in which *some* is to mean *some at least, not all*, may be used to replace the traditional ones. These other forms are:

α_{ab} = all a is all b,
β_{ab} = some a is some b,
γ_{ab} = all a is some b,
ϵ_{ab} = no a is b.

In addition we shall have to employ

the *hypothetical* form,

$x_{ab} \angle y_{ab} = x_{ab}$ implies y_{ab},
$\{x_{ab} \angle y_{ab}\}' = x_{ab}$ does not imply y_{ab},

the *conjunctive* form,

$x_{ab} \cdot y_{ab} = x_{ab}$ and y_{ab},

the *disjunctive* form,

$x_{ab} + y_{ab} = x_{ab}$ or y_{ab}.

Each member of the set, A, E, I, O, may be expressed in the members of the set, α, β, γ, ϵ, and conversely, so that the two are, in fact, logically equivalent, although each one has certain advantages peculiar to itself.

The members of the second set have this property, that, if one is true, then all the others are false.* We assume, accordingly, the

Postulates: $\alpha_{ab} \angle \beta'_{ab}$ $\beta_{ab} \angle \gamma'_{ab}$ $\gamma_{ab} \angle \gamma'_{ba}$
$\alpha_{ab} \angle \gamma'_{ab}$ $\beta_{ab} \angle \epsilon'_{ab}$
$\alpha_{ab} \angle \epsilon'_{ab}$ $\gamma_{ab} \angle \epsilon'_{ab}$

*Provided we exclude the limiting values 0 and 1 for a and b. The ordinary definitions of these limits allow γ_{01} and ϵ_{01} be true together.

from which follow, by the principle of the denial of the consequent, the

Theorems:

$$\epsilon_{ab} \angle \alpha'_{ab} \qquad \gamma_{ab} \angle \alpha'_{ab}$$
$$\epsilon_{ab} \angle \beta'_{ab} \qquad \gamma_{ab} \angle \beta'_{ab}$$
$$\epsilon_{ab} \angle \gamma'_{ab} \qquad \beta_{ab} \angle \alpha'_{ab}$$

Consequently*

$$\alpha_{ab} \cdot \beta_{ab} = 0 \qquad \beta_{ab} \cdot \gamma_{ab} = 0 \qquad \gamma_{ab} \cdot \gamma_{ba} = 0$$
$$\alpha_{ab} \cdot \gamma_{ab} = 0 \qquad \beta_{ab} \cdot \epsilon_{ab} = 0$$
$$\alpha_{ab} \cdot \epsilon_{ab} = 0 \qquad \gamma_{ab} \cdot \epsilon_{ab} = 0 \qquad \text{I}$$

From the *Definitions:***

$$A_{ab} = \alpha_{ab} + \gamma_{ab}$$
$$E_{ab} = \epsilon_{ab}$$
$$I_{ab} = \alpha_{ab} + \beta_{ab} + \gamma_{ab} + \gamma_{ba} \qquad \text{II}$$
$$O_{ab} = \epsilon_{ab} + \beta_{ab} + \gamma_{ba}$$

we obtain immediately***

$$\alpha_{ab} = A_{ab} \cdot A_{ba}$$
$$\beta_{ab} = I_{ab} \cdot O_{ab} \cdot O_{ba}$$
$$\gamma_{ab} = A_{ab} \cdot O_{ba}$$
$$\epsilon_{ab} = E_{ab}$$

It is an advantage of the forms of the original set, an advantage which the set, α, β, γ, ϵ, does not possess, that the contradictory of any letter is represented by a single other letter of the set. Suppose that we were to

---

*$\alpha\ \beta = 0$ reads: α(*is true*) *and* β(*is true*) is *impossible.*

**A, E, I, O are simply the sums given in equations II. That they are the traditional Aristotelian forms, is only an accident of the reader's application. Hence equations II are definitions and not postulates.

***Multiplying out the sums in II as if they were ordinary polynomials, applying the results of I, and assuming that α, β and ϵ are simply convertible.

combine this advantage with that of simple convertibility in a new set of forms.

To do this it would seem to be enough to subtract from the meaning of A_{ab} the part γ_{ab}, (equations II), and to add this part to the meaning of O_{ab}.* Our new set of forms becomes:

$$\begin{aligned} a_{\imath ab} &= a_{ab} \\ \epsilon_{\imath ab} &= \epsilon_{ab} \\ \iota_{\imath ab} &= a_{ab} + \beta_{ab} + \gamma_{ab} + \gamma_{ba} \\ o_{\imath ab} &= \epsilon_{ab} + \beta_{ab} + \gamma_{ab} + \gamma_{ba} \end{aligned} \qquad \text{III}$$

the analogues of the old letters being represented by the corresponding Greek vowels.

From equations I and III, and remembering that the sum of a_{ab}, β_{ab}, γ_{ab}, ϵ_{ab}, γ_{ba} makes up the propositional "universe," the results of the following table, yielding all the moods of immediate inference, will easily be seen to hold.

True	*Implies the truth of only*	*Implies the falsity of only*	*False*	*Implies the truth of only*	*Implies the falsity of only*
a	a, ι	ϵ, o	a	o	a
ϵ	ϵ, o	a, ι	ϵ	ι	ϵ
ι	ι	ϵ	ι	ϵ, o	a, ι
o	o	a	o	a, ι	ϵ, o

An induction of these results shows that $a = o'$, $o = a'$, $\epsilon = \iota'$, $\iota = \epsilon'$, and that, consequently, *contradictory*

*Here would seem to be another instance of the manner in which the language of symbols may free a science from the accidents imposed upon its development by the language of speech. The last two members of the new set have apparently no simple verbal expression.

pairs are a, o and ϵ, ι. Likewise *contraries* are a, ϵ; *subcontraries* are ι, o; *subalterns* are a, ι and ϵ, o.

If we define an *affirmative* form as one that becomes unity when subject and predicate have been identified and a *negative* form as one that becomes unity when subject and predicate have been made contradictory, then it is a result of the following

*Postulates:** a_{aa} is a true proposition,
$\epsilon_{a\bar{a}}$ " " " "

Theorems: β'_{aa} " " " "
γ'_{aa} " " " "
ϵ'_{aa} " " " "
$a'_{a\bar{a}}$ " " " "
$\beta'_{a\bar{a}}$ " " " "
$\gamma'_{a\bar{a}}$ " " " "

and equations III, that a and ι are affirmative and that ϵ and o are negative forms.

If a *distributed* term be one modified by the quantitative adjective *all*, it will be seen that a and ϵ distribute both subject and predicate, while ι and o distribute neither. These results are summarized in the table below, the distributed terms being underlined.

	Affirmative	*Negative*
Universal	$a_{\underline{ab}}$	$\epsilon_{\underline{ab}}$
Particular	ι_{ab}	o_{ab}

*x *is true* is to be represented by $x=1$, x *is false* by $x=0$. (See Boole, Investigation of the Laws of Thought, ch. XI, p. 169). The theorems follow by equations I, and equations III become as a result of them, $\alpha_{aa}=1$, $\epsilon_{aa}=0$, $\iota_{aa}=1$, $o_{aa}=0$, $\alpha_{a\bar{a}}=0$, $\epsilon_{a\bar{a}}=1$, $\iota_{a\bar{a}}=0$, $o_{a\bar{a}}=1$. Employing the usual notation, $\bar{a}$ = not-a.

The traditional rules for detecting the invalid moods of the old syllogism, constructed from the set A, E, I, O, hold for the new syllogism, built up out of the forms, a, ϵ, ι, o. These rules are:

1. Two negative premises do not imply a conclusion. *Ex.* $\epsilon_{ba}\,\epsilon_{cb} \angle \epsilon_{ca}$.

2. Two affirmative premises do not imply a negative conclusion. *Ex.* $a_{ba}\,a_{cb} \angle \epsilon_{ca}$.

3. An affirmative and a negative premise do not imply an affirmative conclusion. *Ex.* $a_{ba}\,\epsilon_{cb} \angle a_{ca}$.

4. Two premises, in neither of which the middle term is distributed, do not imply a conclusion. *Ex.* $\iota_{ba}\,\iota_{cb} \angle \iota_{ca}$.

5. Two premises, in which a given term occurs undistributed, do not imply a conclusion, in which that same term is distributed. *Ex.* $a_{ba}\,\iota_{cb} \angle a_{ca}$.

The valid moods which remain, and which of course are valid in all four figures, since each one of the forms is simply convertible, are twelve in number, viz:

aaa	$aa\iota$	$a\epsilon\epsilon$	$a\epsilon o$
$a\iota\iota$	aoo	$\epsilon a\epsilon$	ϵao
$\iota a\iota$	oao	$\epsilon\iota o$	$\iota\epsilon o$

It has been previously observed, (note p. 2), that equations I hold generally only when the limits 0 and 1 are excluded as possible values of a and b. If these possibilities he included, we shall have to assume:

$\{\gamma_{ab} \angle \epsilon'_{ab}\}'$ and $\therefore \{\epsilon_{ab} \angle \gamma'_{ab}\}'$, since $\gamma_{01}\,\epsilon_{01} \neq 0$.
Equations I then become:

$$\begin{aligned} &a_{ab} \cdot \beta_{ab} = 0 && \beta_{ab} \cdot \gamma_{ab} = 0 \\ &a_{ab} \cdot \gamma_{ab} = 0 && \beta_{ab} \cdot \epsilon_{ab} = 0 \qquad \text{IV} \\ &a_{ab} \cdot \epsilon_{ab} = 0 && \gamma_{ab} \cdot \epsilon_{ab} \neq 0 \end{aligned}$$

Under these conditions, the fact which the old logic always took for granted, that E_{ab} is the contradictory of I_{ab}, and A_{ab} the contradictory of O_{ab}, no longer holds true. For, while the sum of each of these two pairs of forms is the propositional universe, their product is not the propositional null, (equations II, IV). In order that $E_{ab} \cdot I_{ab}$ and $A_{ab} \cdot O_{ab}$ shall vanish for all values of the terms, it will be necessary to exclude $\gamma_{ab}\ \epsilon_{ab}$ from the product. A new set of forms, in which part of the meaning of ι_{ab} is subtracted from ι_{ab} and added to ϵ_{ab}, will satisfy this requirement. Let this new set be:

$$
\begin{aligned}
a_{2ab} &= a_{ab} \\
\epsilon_{2ab} &= \epsilon_{ab} + \gamma_{ab} + \gamma_{ba} \\
\iota_{2ab} &= a_{ab} + \beta_{ab} \\
o_{2ab} &= \epsilon_{ab} + \beta_{ab} + \gamma_{ab} + \gamma_{ba}
\end{aligned}
\qquad \text{V}
$$

If a, ϵ, ι, o, be replaced by a_2, ϵ_2, ι_2, o_2, respectively in the table, (p. 38), all the results of such a new tabulation will be seen to hold, (equations IV, V). The same definitions as given before will make a_2 and ι_2 affirmative, ϵ_2 and o_2 negative forms, (equations V, and the postulates and theorems, p. 39), but since ϵ_2 distributes neither subject nor predicate, $\epsilon_2\ \iota_2\ o_2$ and $\iota_2\ \epsilon_2\ o_2$ will not be found among the valid moods of the syllogism, (see p. 40). The same rules (p. 40) for the detection of the invalid moods will hold for the new syllogism, but rule 1 is now redundant, being a corollary of rule 4.

It might perhaps appear that our original symmetry, (that of equations I), which was interrupted by the necessity of allowing γ_{01} to stand as a true proposition, could be saved by assuming that the null class exhausts no part of the universe, i. e. *all of nothing is some of everything*, might be regarded as a false proposition. Now $A_{0a} = 1$,

or $a_{oa} + \gamma_{oa} = 1$, is Schröder's definition of the null class, and A_{oa} will be a true proposition for all values of a if $\gamma_{oı}$ be true, whereas, $\gamma_{oı} = 0$ involves $A_{oı} = 0$. These consequences lead us to the alternatives of either giving up our symmetry, (in equations I), or else of regarding the null class as not essential to our algebra.

It is finally to be noted—what was obvious in the beginning—that, while the members of the set, a, ϵ, ι, o, can be expressed in the members of the set, a, β, γ, ϵ, the latter can not be expressed in the former. Consequently, an essential difference has been lost, and the existence of a completed logic of the new forms would not put aside the necessity of working out the logic of the old.

The attempts of the logician to discover a set of categorical forms, which establish a complete symmetry among the moods and figures of the syllogism, are as old as the science itself. The end would be attained if a new set could be selected so as to satisfy the following conditions:

1. Each form of the set must be simply convertible.
2. Corresponding to any member of the set, there must occur another which represents its contradictory.
3. The new set must yield at least one valid mood of the syllogism.
4. Each member of the new set must be representable in the members of a set already proved necessary and sufficient to express all differences, (the set A, E, I, O, say), and conversely.

If x_{ab} be any categorical form, the simplest functions of x, which are themselves categorical and which are in general simply convertible, are $x_{ab} \cdot x_{ba}$ and $x_{ab} + x_{ba}$. It will be enough, therefore, in order to satisfy condition 1,

to assume as a new set of forms either such a sum or such a product of each one of the old forms (A, E, I, O, say).

The equation, $\{x_{ab} \cdot x_{ba}\}' = x'_{ab} + x'_{ba}$, suggests at once what our manner of satisfying condition 2 must be, for since the product, $x_{ab} \cdot x_{ba}$ is the contradictory of the sum $x'_{ab} + x'_{ba}$ and x the contradictory of x', if $x_{ab} + x_{ba}$ [respectively $x_{ab} \cdot x_{ba}$] be chosen as one of our new forms, $x'_{ab} \cdot x'_{ba}$ [respectively $x'_{ab} + x'_{ba}$] must be chosen as one of the others.

Remembering that

$$E_{ab} = E_{ab} \cdot E_{ba} = E_{ab} + E_{ba},$$

and $I_{ab} = I_{ab} \cdot I_{ba} = I_{ab} + I_{ba},$

and that $E_{ab} = I'_{ab}$ and $I_{ab} = E'_{ab},$

it follows that our choice of a new set of forms is limited to the following two:

$$A_1 = A_{ab} \cdot A_{ba}, \quad E_1 = E_{ab}, \quad O_1 = O_{ab} + O_{ba}, \quad I_1 = I_{ab}, \tag{1}$$

$$A_2 = A_{ab} + A_{ba}, \quad E_2 = E_{ab}, \quad O_2 = O_{ab} \cdot O_{ba}, \quad I_2 = I_{ab}. \tag{2}$$

It will be found, however, that the set (2) yields no valid moods of the syllogism. Consequently, applying condition 3, our choice is seen to be unambiguously restricted to set (1), which yields twelve moods, valid each one in each of the four figures. These will be found to be, (dropping the subscripts):

A A A,	A A I,	A E E,	A E O,
A I I,	A O O,	E A E,	E A O,
I A I,	O A O,	E I O,	I E O.

It will be impossible, however, to satisfy condition 4, since every expression involving the new forms will be

simply convertible. Consequently, an essential difference has been left undistinguished, and it will not be possible to substitute the new forms for the old. The new forms are, in fact, identical with a_I, ϵ_I, ι_I, o_I, considered above.

From this latter discussion and from the discussion that has gone before, we conclude, that, if it be necessary to retain in our set of forms at least one that is not simply convertible, it will be impossible to satisfy the condition 2 above, unless the null-and one-class be excluded or defined in some way other than ordinary.

APPENDIX II

Historical Note on De Morgan's New Propositional Forms

In introducing the notion of contradictory terms into logic De Morgan discovered two new propositional forms, which cannot be directly expressed by means of the A, E, I, O relations of traditional logic.* Suppose that we denote these two forms by U and V, i. e.

U (ab) = All not a is b,
V (ab) = Some not a is not b,
A (ab) = All a is b,
E (ab) = No a is b,
I (ab) = Some a is b,
O (ab) = Some a is not b.

U and V are simply convertible, for (if $\bar{a}$ = not-a) U(ab) = A ($\bar{a}$b) = A ($\bar{b}$a) = U (ba), (converting in A by the principle of contraposition), and

V (ab) = I ($\bar{a}\bar{b}$) = I ($\bar{b}\bar{a}$) = V (ba), (converting simply in I).

V distributes both subject and predicate while U distributes neither, for V(ab) = O($\bar{a}$b) = O($\bar{b}$a) (converting in O by contraposition) and, since O distributes its predicate, both a and b are distributed terms; similarly U(ab) = A($\bar{a}$b) = A($\bar{b}$a) (converting in A by contraposition) and, since A does not distribute its predicate, a and b are undistributed terms.

If an affirmative form be defined as one that becomes the subcontrary of itself when the subject and predicate

*Formal Logic, p. 61.

have been identified, and a negative form as one that becomes the contrary of itself under the same conditions, it will be seen that A, I and V are affirmative, that E, O and U are negative forms.

These results are summarized in the following table, the distributed terms being underlined.

	Affirmative	*Negative*
Universal	A(a̲b̲)	E(a̲b̲)
Particular	I(ab)	O(ab̲)
Indefinite	V(a̲b̲)	U(ab)

Below are tabulated all the forms of immediate implication which hold among the six propositions A, E, I, O, U, V. The (144) implications and non-implications necessary to establish unambiguously the results of the table can be derived from a certain number of postulates and the commonly assumed principles of traditional logic.

True	*Implies falsity of*	*Implies truth of*	*False*	*Implies falsity of*	*Implies truth of*
A	E, O, U.	A, I, V.	A	A.	O.
E	A, I.	E, O.	E	E.	I.
I	E.	I.	I	A, I.	E, O.
O	A.	O.	O	E, O, U.	A, I, V.
U	A, V.	O, U.	U	U.	V.
V	U.	V.	V	A, V.	O, U.

An induction of these results will show that:
Contradictory pairs are: A, O; E, I; U, V;
Contrary pairs are: A, E; A, U;

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Subcontrary pairs are: I, O; O, V;
Subalternate pairs are: A, I; A, V; I, V; I, U; E, O; E, U; E, V; U, O.

In order to show how the new forms fit the ancient scheme and as an illustration of method let us solve the array of the syllogism. We first observe (see table) that A weakens ambiguously to I or V; that O strengthens ambiguously to E or U.*

Rules:

1. In any valid mood interchange either premise and the conclusion and replace each by its contradictory.
2. In any valid mood strengthen a premise or weaken a conclusion.
3. In any valid mood convert simply in any form but A or O.

Postulates:

A A A (1st figure) is a valid mood.
A U U (" ") " " " "
E A E (" ") " " " "
U E A (" ") " " " "

From these rules and postulates will follow sixteen valid moods in the 1st figure, twenty in each one of the 2nd and 3rd figures, and twenty-one in the 4th figure.

In order to deduce the invalid moods let us assume the

Rules:

1. In any invalid mood interchange either premise and the conclusion and replace each by its contradictory.

---

*If x implies y but y does not imply x, then x is said to be a *strengthened* form of y, and y is said to be a *weakened* form of x.

2. In any invalid mood weaken a premise or strengthen a conclusion.

3. In any invalid mood convert simply in any form but A or O; and

Postulates:

A A A (4th figure) is an invalid mood.
A A O (" ") " " " "
A A V (3rd ") " " " "
A A I (2nd ") " " " "
A A O (1st ") " " " "
E E I (" ") " " " "
E E O (" ") " " " "
E U A (" ") " " " "
E U O (" ") " " " "
U U O (" ") " " " "
U U V (" ") " " " "

From these postulates and rules follow the remaining (772) invalid moods.

It will be seen at once that the rules of the old logic for the immediate detection of the invalid moods of the syllogism no longer hold. To give only one illustration: A term may appear distributed in the conclusion of a valid mood and be undistributed in the premise.

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A

MANUAL OF LOGIC:

BEING ONE OF TWO SEQUELS TO "GRAMMAR ON ITS TRUE BASIS."

By B. H. SMART,

AUTHOR OF "BEGINNINGS OF A NEW SCHOOL OF METAPHYSICS;" "A MANUAL OF GRAMMAR;" "A MANUAL OF RHETORIC;" "WALKER REMODELLED;" "THEORY AND PRACTICE OF ELOCUTION;" &c.

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PREFACE.

THIS Manual of Logic is humble in its size, and form of publication; but in its *principles* it pretends to originality, and in its *purpose* to interfere with doctrines that have been advocated by some of the profoundest teachers of our kind. I wish, therefore, in this preface, to excuse such presumption as this very statement carries with it, and to soften, as well as I can, the prejudice which I may raise by making it.

First, then, for my pretensions to originality. I think I have the good fortune to start, in this work, with a few self-evident, or nearly self-evident principles, which have been overlooked by all who have gone before me in this department of learning. What they are, and how they affect the kind of instruction here proposed, will appear on an examination of the work; but I may as well indicate them at present, in order that the critical examiner may be prepared to trace their effect in the detail which follows. In the first place, I think it all but self-evident, if not quite so, that every single word competently used, is the sign of *knowledge*, and that, in calling it the sign of an *idea*, we either mean the same thing, or we have no distinct, definite meaning

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in so using the term *idea*. Secondly, it appears to me another self-evident truth, that every act of the natural understanding which increases or which develops our knowledge, involves three things,—the thing newly-known or newly-recognized; the thing or things in some relation to it, by being aware of which relation, it *is* newly, or better known; and the knowledge itself; which knowledge it is the privilege of our species to entertain separately, (apart, abstractly,) so as to be applicable to other things hypothetically, in order, by inquiry, to push our knowledge further. If to others, as to myself, this statement should not convey a self-evident truth, I believe the obstruction to be no other than will be removed by the examples, furnished in various places throughout this work. Thirdly, it appears also self-evident to me, and, with less difficulty than attends the previous statement, will I think, appear evident to others, that words which join to make sense, lose their separate (their more abstract) meaning, in a meaning which they unite to signify; so that the longest expression which can be formed by words that, in this manner, make sense, are but as one single word, with reference to the sense which is thus attained and signified.

Such are the principles,—few, simple, and self-evident, or very nearly so,—which have nevertheless been overlooked, or at least, not considered up to their full weight, by those who have formed systems of logic, especially by Aristotle and his followers; by those who, in any past days, have

speculated on the laws of human thought, and on the origin, the nature, and possible compass of human knowledge. I take these principles with me in the execution of the little work which follows; with what success must be judged by its contents.

But while I speak thus confidently of the ground I take, I feel, and am ready to acknowledge, with deep humility, the imperfections that must be discovered in what I have done to build upon it. It is one thing to plan, and another to execute; and every-one, even from the size of my volume will be ready at once to say, *Parturiunt montes, nascitur,* &c.

There is another preconceived objection, which, I cannot help feeling, will stand in my way. I am nobody. I belong to no learned body. I have previously produced nothing that the world has much regarded. May I be permitted, without the charge of unnecessarily speaking of myself, to make such a statement, as, with impartial persons, will, I trust, have some weight against this objection.

A man can but do what the short space of life allows; and if his time has not been occupied in pursuits adverse to, and calling him away from some one pursuit in which he takes an interest, he may achieve, in that one pursuit, as much as another; —he may achieve much more than others of far greater natural powers, if he comes after them, and takes up what they have begun, but left unfinished. Such, I believe to be my predicament. Nor do I come forward for the first time, with the fruits of my inquiries. Twenty years ago, I published in

theory what I now offer in a practical work; having had abundant opportunity, in the intervening years, of testing, with pupils of various age, and of every degree of competency, the effect of such instruction as the following pages contain.

And now, if it be asked what sect or denomination of past teachers in logic and speculative science I adhere to,—I answer, to none. I have endeavoured to keep clear of all *extremes* in opinion:—I am not a Sensationalist with the French philosophers; I am not an Idealist with the German: I give no countenance to Materialism; and I hold not, with Berkeley, that there is nothing outward to the mind. I am not of the Scottish school; for I see no *scientific* ground for a Philosophy of the Mind in contradistinction to a Philosophy of Matter, or as a part of the Philosophy of Man, yet fitted to be treated distinctly from Man. I wonder therefore that Mr. MORELL, in his able History of Modern Philosophy, should have placed me among the *Scoto*-English Metaphysicians. The following pages will, I think, take me out of that category, and leave me purely English.

On points transcending Philosophy, I do not declare my creed; for those are points that lie beyond the limits of such a work as this; and I think the cause of religion is never served by *forcing* religious considerations into science of human origin. The structure built from the earth, ought indeed to prove its own truth by meeting and coinciding with truth that comes from the skies; and it must

coincide either now or eventually; for He who gives the light from above, also gives the power to raise the edifice from below. It is happy for me that what I happen to have reached, or imagine I have reached, of truth in these pages, does not, in any part, stand in contradiction to the doctrines of the Bible.

Something remains by way of advertisement to my Readers. I have placed in the Index at the end, some points that I was glad to exclude from the body of the work:—for instance, under the word Locke, I have indicated in what manner both Locke and Horne Tooke, after beginning well, went completely astray. I conceive myself nevertheless to be a follower of those two men; and only hope I have escaped the errors of my masters. If I have not been able thus to avoid other controversial points in making up what I intend for a practical work, yet I have so placed the more abstruse matter, that the learner may quite avoid it in pursuing his first Course of instruction. For his guidance, and that of the teacher who may not have time and opportunity to extract a better plan, I have given an Outline for a First Course of Logic in the Appendix. Under *Philosophy, Philosophers,* in the Index, I have furnished a brief memorial of the changes in speculative opinion among the Greeks, and a still slighter intimation of the movement of such opinion into times comparatively modern. Should the reader desire an account to the same purpose, something

more extended, and much more elegantly stated, he will find it in the "Philosophy of the Mind," by Mr. J. Douglas of Cavers. If he should wish to know, beyond what he can learn from the hints scattered in this Manual, the state of Speculative Philosophy at the present day, he cannot do better than consult Mr. Morell's History previously alluded to. And if my meagre allusion, in the Index, to Schoolmen and Scholastic learning, should raise a desire to know more, Mr. Hallam's Introduction to the Literature of Europe, and Dr. Whewell's two works, the History, and the Philosophy, of the Inductive Sciences, will supply all that can be needed.

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MANUAL OF LOGIC.

CHAPTER I.

OUTLINE THEORY OF LOGIC.

1. Logic is a branch of learning connected with Grammar and Rhetoric. While Grammar looks only to correctness of *construction*, or properly putting the parts of speech together so that they shall be accurate *forms* of language; and Rhetoric varies those forms in order to make them expressive of *emotion;* Logic looks to the *sense* which language has to convey, clear from any emotion which may, or may not be its effect. The sense of any single word is the knowledge which it signifies; the sense of two or more words put together, is the development of the knowledge included, or assumed to be included, in each of the separate words, and meeting in the more particular knowledge, which the two or more words unite to express. Thus *red* denotes the knowledge of what red is, derived from a great many particular things; *earth* denotes the knowledge of what an earth is, derived in the same way; while *red earth*, which is one expression for one meaning, indicates the development of the previous knowledge in one of the particulars assumed to be already included in the knowledge denoted by each separate word. We may call *red* and *earth* the premises of a conclusion which must rationally follow from their union: we may call *red earth* the conclusion from these premises.

2. The process of the understanding by which knowledge is accumulated and included under a sign, is called *Induction;* the process by which the knowledge so accumulated is spread again before the understanding in words, which being joined together, make evident *sense*, that is to say, make one expression with one meaning, is called *Deduction.*

3. The logical function of a word is one thing; its grammatical function, another: logical completeness is one thing; and grammatical completeness another. Take the four words,

Every man is mortal, separately, and each has a separate meaning; each is the sign of knowledge. The grammatical function is something added to this its logical function; but being added, it has this effect, that we are required not to rest in the meaning of the separate parts, but to go on till a whole is formed out of the parts, and to understand that whole as one expression for one meaning. But logical completeness may, or may not coincide with grammatical completeness. The construction is complete when we say *Every man is mortal;* yet we may go on developing our knowledge in forms of expression grammatically independent of each other, as when we add to the foregoing expression, *Every king is a man.* These two expressions which are grammatically distinct, have the same ground of logical connection as the following two, which are grammatical parts of one construction: *A king like every other man;* and, *Is mortal.* In both instances, the expressions signify premises involving a conclusion. In the former instance, the conclusion must be expressed, like the premises, in a sentence of independent form; *Therefore, every king is mortal.* In the other instance, we have but to put the two grammatical parts together, and the same conclusion will be signified; as, *A king like every other man is mortal.*

4. Every one who learns and uses a language learns and practises logic both *in*ductively and *de*ductively. A book on logic can do nothing more, and therefore ought to propose nothing more, than to assist this practice by unfolding its theory, in order that the practice may, as far as possible, be free from the mistakes and failures, to which all practice is liable, which is unsupported by correspondent theoretical knowledge.

Note to Chapter I.

To any one acquainted with the Science of the formal Syllogism, it will at once appear that the art or practice shadowed out in the previous brief sections, must be a logic distinct from Aristotle's. It is so:—yet it is the logic of our race,—with reference to which fact we may call it OUR logic, the logic in use—that always has been in use by mankind, including the Aristotelians themselves when not occupied within their especial domain. With this declaration, we might pass on, and leave the Aristotelians to themselves, if their science were not asserted to be the theory of *our* logic,—the science of reasoning as it is exercised by all man-

* The pages, on account of the common Index, follow those of the Manual of Rhetoric.

kind through the instrumentality of language. One writer indeed, understood, I believe, to be Sir William Hamilton, profound beyond any man of the present day in scholastic learning, appears to repudiate, although himself an advocate of formal logic, any blending of it with other doctrine, censuring, in a very learned Article of the Edinburgh Review (April 1833) "the attempts lately made to conciliate, to the *declining* study a broader interest than its own." Dr. Whately, then of Oxford, now the Archbishop of Dublin, has eminently succeeded in an attempt thus characterized. Of him, the reviewer says that he is "a very shrewd, and (what is rarer in Oxford) a very independent thinker." The effect of Dr. Whately's Oxford education, joined to his shrewdness and independence of mind, has been this,—that the logic of Aristotle, rejected by philosophy since she succeeded in throwing off the trammels imposed by the schoolmen, has, through him, regained a footing in *some* places,* which, but for him, she had lost for ever, "Oxford," as the reviewer observes, "being the only British seminary where the study of logic-proper" (formal logic) "can be said to have survived." Now as to this logic, we are ready to admit before proceeding further with ours, that it *is* a science, and it *is* an art, but a science and an art quite distinct from our logic, re-asserting that ours is the logic in use by mankind:—and what we have to say of Dr. Whately's treatise, is, that it owes its popularity not to what it contains of Aristotelian logic, but in spite of what it contains, by the excellence of the matter which he erroneously arrogates as a part of that logic. Had his volume presented nothing but what pertains to formal logic, we might have left him to whatever arguments can be found in its favour: but in order to bring it back into respect, he far transcends its proper sphere. First alleging, what is not true, that all reasoning whatever has its foundation in the principle of the formal syllogism, he proceeds to discourse, with admirable intelligence and skill, on the many causes of faulty induction; the notice of which properly belongs only to such a work as the present,—such for instance as the errors imbibed through the instrumentality of language, the force of prejudice on our thoughts, the crudities engendered by imperfect systems; which kind of matter we affirm to have no proper place within the limits of formal logic. How true an observation is the following! "A fallacy which, stated barely, would not deceive even a child, may deceive half the world when diluted into a volume." (Logic: Of Fallacies, III. § 6.) Of the soundness of this remark, it would not be easy to find a better instance than Dr. Whately's own volume. Let the logic of Aristotle stand separate and alone, and it cannot be saved from the neglect into which it was confessedly falling: dilute it through the excellent, but distinct matter, which forms the bulk of Dr. Whately's volume, and half the world are inclined in its favour. Of the half world thus biassed, one part will be incapable, and the rest indisposed, that is too idle, to dissipate the superinduced error; for, as Dr. Whately says in another place, "there is probably not one person in ten, who is physically capable of the degree of steady application requisite for embracing the principles of logic, or any other science; and, a much

* Wonderful to say, chiefly in America, the country celebrated for *going-a-head.*

greater number to whom this, though not an impossibility, is a very great difficulty." (Preface—early editions.) Thus, then, it is *possible* that Dr. Whately's "Logic," may have acquired a temporary popularity, in spite of a radical defect, which, when known, must vitiate the whole as a system, though what is unfairly made a part of that system cannot be deprived of its independent merit. And this *possible* defect we assert to be *actual*. The formal syllogism, which he makes the basis of his system, is not the basis of all reasoning. It is a purely *grammatical* contrivance for reducing every other form of expression to one single form, without any change of the mental act by which the knowledge signified was received. The things of sense inevitably suggest unnumbered relations to the understanding:—the following is only one of them,—that if a thing is contained in or under another, and this under a third, the first is contained under the third. But so plastic is language by the possible variation of terms, of propositions, and of larger forms of discourse, (all of which differ as *grammatical* forms only, without corresponding differences in the reasoning mind,) that we can, if we please, express any other understood relation, in the form strictly appropriate to one; through which possibility, we have a science, of which the enunciation of the one particular relation referred to above, is the axiom, while the art, (a purely grammatical art,) is the reduction of every expression to the one form, that so the axiom may be applied to it, and a demonstration scientifically ensue. In all cases this will be a demonstration of what is already *inevitably* understood;—as Dugald Stewart says,—the demonstration of a demonstration; and the practice will be, (so far as we keep to the practice which belongs to the science,) that, dismissing from the mind the things concerning which we reason, we shall reason *with* the words, and not immediately concerning the things the knowledge of which is included in the words: briefly, we shall reason *with* words, and not by *means* of words; the latter of which is proposed by *our* logic. The value of this art and science, needs not be here discussed: all we mean at present, is to assert its distinctness from our logic: more about it will be learned as we proceed. It may be sufficient to have stated thus much now, with the hope that what cannot be made quite clear to *our* student in the present stage of his progress, will become so as he advances.

CHAPTER II.

INDUCTIVE LOGIC.

1. Inductive Logic is the art or practice of gathering knowledge by the instrumentality of words. In every act pertaining to this practice, three things occur, the knowledge which the word already includes, the thing known by reason of this previous knowledge, and the increased knowledge which includes some other thing or things. What follows will, it is hoped, make this doctrine understood.

Theory of Inductive Logic.

2. We use a word inductively when, having some certain knowledge which it represents, we advance, by its assistance, to further knowledge, which we *draw under* or *into* the same sign. Let us suppose the word *red* was originally an exclamation uttered on first becoming conscious of that sensation;* and let us suppose that it subsequently loses its exclamative character, and remains a sign of that first knowledge:—when the sensation re-occurs, the knowledge re-occurs, and with it the sign; and by the aid of the sign, we are able to entertain our first knowledge of what *red* is, distinctly from the varying circumstances of its re-occurrence, and to include under it what is common to both occasions of knowledge; to include, for instance, under the same word *red*, the knowledge derived from the red of the crocus, and from the red of a certain earth; and thus we go on, including with our greater experience more and more knowledge under the same sign, till we have extended its meaning as far as convenience or the custom of language allows.

3. Let us take the word *man* as another example: let us suppose it was at first an exclamation uttered on first having knowledge of a creature that was not one's self, yet was like one's self: let us suppose it to lose its exclamative character, and to remain a sign of that first knowledge:—when another occasion of similar knowledge occurs, the former knowledge occurs with it, and the sign enables us to include what is common to both occasions; to include, for instance, under the same word *man*, the knowledge of what a man is, derived from the tall dark man, and the short fair man; and thus we go on till we include under the same sign all attainable knowledge of our species as distinguished from creatures of every other species.

4. Let us take the word *John* as a third example: let us suppose, that this was at first an exclamation uttered when we first knew *John* distinctly from self: let us suppose it to lose

* If we know nothing except by reason of something already known, it is a fair question to ask, how our knowledge can have had a beginning. This question, which needs not stop us here, I have endeavoured to answer in "Beginnings of a New School of Metaphysics;" Second Essay (Sequel) page 73.

its exclamative character, and to remain as a sign of this our first knowledge of John:—when another occasion of knowing John occurs, the former knowledge occurs with it, and we now know him distinctly from each occasion in particular,—from the occasion when he was walking cheerful in the garden, and this new occasion when he is lying sorrowful on the bed. Thus we go on, augmenting our knowledge of John, by familiarity with him under various circumstances of his existence, and including this knowledge in the sign which is his proper name.

5. Let us take the word *proud* or *pride* as a fourth example: let us suppose it to have been an exclamation, when, for the first time, some one person was known to treat another proudly: let it lose its exclamative character, and remain a sign of that first knowledge: the next occasion of similar knowledge may be quite different in persons and circumstances; yet, with the aid of the sign, we are able to hold our knowledge of what it is to be proud, or to have pride, distinctly from the variable circumstances; and by the same aid, we can go on increasing this knowledge, by deriving it from a larger and larger number of instances; and including our enlarged knowledge in the sign which helps us onward to still larger.

6. We shall better understand the previous representation of the manner in which our knowledge is increased, and of the use of signs in fixing and helping it onward, by a few further considerations.

First, we have to consider that all our knowledge is originally derived from the things of sense.* Yet a sensation is

* This, as it is well known, is Locke's doctrine; a doctrine which, carried out on mistaken principles by some of his followers, particularly in France, has issued in what is called *Sensationalism*. The philosophers of this school propose to show that all ideas begin by being sensations, which doctrine another school of philosophers, chiefly Germans, oppose by what is called *Idealism;* or the assertion of certain principles or original ideas existing in or being a part of the mind itself. Extremes of opinion seldom fail to be erroneous; and as seldom does it happen that, before the extremes are reached, there is not, in whatever opposing doctrines, some truth on both sides. With regard to the statement in the text, *if taken in connection with what immediately follows it*, it can scarcely give offence to either of the parties just alluded to:—the Idealists cannot say that we reduce everything to sensation; nor can the Sensationalists aver

not knowledge; nor can it, by itself, create, or be created into knowledge: there must be a knowing faculty, or capacity to know. Now, to know a thing is to be aware of its relation or relations to some other thing or things: to know red, for example, there must be something else known at the same time with it: we must know blue, black, or white, &c., at the same time that we know red. Wherever there is knowledge, there are therefore premises, of which that knowledge is the conclusion; and *red* expresses a conclusion out of such premises. Neither do we know what man is, but by knowing at the same time what is not a man: neither do we know John as an individual, but by being aware of John's existence distinctly from the changeable circumstances of his existence: neither do we know what it is to be proud or have pride, but by knowing what it is not to be proud. In all these instances, (and in all other instances it is the same,) the word which signifies knowledge, signifies a conclusion arising out of premises.

In this process of gathering knowledge, we suppose the previous knowledge and the new phenomena to be so brought before the intellect, that an inference instantly arises. But new phenomena often present themselves under circumstances that ought to occasion doubt; and we then exert or ought to exert some consideration before we admit an inference; which is called a use of our JUDGEMENT. This is a voluntary act, and upon it we lay the blame or praise of the inference. We have, for example, a new substance before us which *seems* to be an earth, and we include it under that name. If it turn out not to be an earth, we say our judgement has deceived us, and what we calculated upon as warranting a conclusion in the deductive process, remains a faulty inference in the inductive. This observation was proper to be made in this place, though it needs not further impede the development of the theory in progress.

7. Secondly, then, (to go on with our theoretical development,) we have to consider that a sign cannot legitimately

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that we suppose the existence of original ideas, inasmuch as we go no further than the supposition of a power or capacity to receive knowledge; although, as it should seem, contrarily to the Sensationalists, we affirm it to be a power or capacity distinct from the capacity or liability to have sensations.

signify more knowledge than we have attained; and that, of such knowledge, it may signify just so much as our immediate purpose requires. We may, for instance, use the word *red* only as the sign of knowledge derived from the experience of one thing that produces the sensation, and from want of experience; or by choice, we may exclude from the meaning of the word the varieties of red derived from a wider experience, for which, by the custom of speech, the word may be the sign. We may use the word *man*, through ignorance or by choice, only to signify our knowledge of what a man is, distinctly from a boy or a woman. We may use the word *John*, by necessity or choice, to signify no more knowledge of him than the slightest acquaintance gives to any person; and not even so much knowledge as this, but only the knowledge that John exists or has existed as an individual person. We may use the word *proud* or *pride*, only as the sign of knowledge derived from the single action of one single person toward another; and not include under it that wider knowledge which greater experience brings. In all these instances, (and all single words would but multiply the instances,) the sign is legitimately used, provided our knowledge and the sign are coextensive, and we do not confuse our natural understanding by using the sign to supply the place of knowledge.

8. But thirdly we have to consider that all our knowledge is not gained by our own experience: we depend, as a race, in a very great degree on the experience of others, and take our knowledge, in large proportion, on credit. Hence we embrace, as our own knowledge, all the credible parts of past history; all that is reported to us of credible present history; nay, all the facts of experimental science, which others and not ourselves have arrived at, and which we may have never witnessed, but believe to be.

9. And while, with the assistance of a carefully applied logic, we are becoming, by experience, and by fairly received testimony, better and better acquainted with the *real* world, there is an *ideal* world, always enlarging, which we have to keep clearly understood in its relation to the other. Our senses, after having been operated upon by the things fitted to affect them, are not quiescent even when the things are no longer present: the nerves of those senses work internally, though the outward organs are not impressed, and the things

re-appear, but in such a manner that we cannot fail to distinguish them from the realities, unless in a state of sleep when the realities are quite absent, or in certain states of disease which preternaturally affect the nerves of those senses. Supposing, then, a healthy waking state of the faculties, we have to keep our knowledge of the one world clear from any confusion which must arise from mingling the things of the other as a part of it; and this point being secured, we find that as transcripts of the things of the real world, those of the ideal materially assist the understanding in the inductive part of learning.

Note to the previous Section.

The ideal world here spoken of, does not consist of the ideas of Platonic philosophy; these, under our own point of view, we have to speak of in the next section; it is a transcript of the outward world as it has reached the understanding through the senses. But the character of this ideal world must depend on the senses through which it has been received. We commonly mean by it a transcript of the *visual* world. Now this it cannot be to one born blind, or so early deprived of sight as to be equally circumstanced. Yet such a one, (witness Blacklock the blind poet of Scotland,) has an ideal world as complete, apparently, even for poetry, as the ideal world of him who enjoys the full sense of vision. Do we not attribute to Sight, as the inlet of the ideal world spoken of, a greater instrumentality in the reception of our earliest knowledge than it can fairly claim? I have before me what I consider a most able philosophical treatise communicated by the author, of whom I know nothing beyond the favour of his gift sent without date or mention of residence, the title of which is,—"The Principles of Geometrical Demonstration deduced from the original Conceptions of Space and Form: by H. Wedgwood, M.A. late Fellow of Chr. Coll. Camb.;" (Taylor and Walton, 1844;) in following out which deduction, the author shows, that not our *visual*, but our *tactual* impressions, are the early inlet of all the fundamental knowledge placed within the reach of our species.

10. In pursuing the theory of inductive logic, we next find, that beyond the things of sense and the ideal things that reflect them, there are things, the pure abstract stores of the understanding, in following the relations of which, the understanding enjoys a peculiar triumph, as moving in a world entirely its own. These things are properly called *transcendental* or *metaphysical*, because they *transcend* real and ideal things,—because they lie *beyond* the bounds of *nature*.* Every single

* Μετὰ beyond,—φύσις nature. It is doubtful, however, whether the term *Metaphysics* was at first meant to be understood as here explained.

word whatever has its immediate correspondence with such a thing, and only through the medium here indicated has it a correspondence with the things of sense: that is to say, knowledge itself is always metaphysical, though the things we first know, are always things physical. The knowledge, for instance, which we have of *red* is not, itself, either the real or the ideal sensation of red, but something above or beyond it:* the knowledge which we have of *John* is not John himself, and it transcends, or is abstract from, our actual perception of him, and from any idea, that is, image of him which we distinctly form; since in either of these cases, John must be perceived or conceived sitting, standing, lying, or walking, sick or well, older or younger; while the knowledge we have of John, though it includes all these circumstances as they have arisen in our experience, is nevertheless separate from them, since to know John, is to know him distinctly from and beyond those variable circumstances, and from and beyond every other variable circumstance that has arisen in our experience, or may arise:†—the knowledge which we

* Not distinguishing between these is the fundamental error of the Sensationalists. Mr. James Mill, who is one of them, lays it down as a fact that to be in pain and to be conscious of pain, is one and the same thing: it seems so indeed, because, in the recollected experience of every one of *us*, they always come together. But if any one had existed in a single continued state of pain from the moment when sensitive being commenced,—(it may seem strange to say, but philosophical reflection will show it to be true,) he would be in what *we* call pain, yet would not know what it was; which is only another way of saying, he would not be conscious of it. If further words could make plainer, what perhaps is beyond the reach of an understanding that requires more than a few minutes reflection to embrace it,—we might say that one unchanging state of existence such as we have supposed, would not be a state that *happens* to the person,—it would be his very existence, his *very self*. *We* know or are conscious of pain, because we know what is not pain, what is relief from pain, what is pleasure. So we know pleasure because we know pain; we know good because we know evil, and evil because we know good.

† The following passage from Dr. Whately's Logic, is to the same purpose. "When we are speaking of an individual, it is usually an abstract notion that we form; *e. g.* Suppose we are speaking (in 1847) of the present King of the French; he must actually *be* either in Paris or elsewhere; sitting, standing, or in some other posture; and in such and such a dress, &c. We abstract from the separable accidents what we consider essential to the individual, thus forming an abstract notion of the individual." (Book II. Chap. V. § 2.)

have of man transcends, in like manner, the perception or conception of any man in particular; and the knowledge we include under the word *proud* or *pride* is knowledge abstracted or separated from any other knowledge we entertain of the persons who are proud. Now though all knowledge is originally derived from the things of sense, and is of value to us here only in proportion as it is re-applicable to them; yet we have the power, as we advance in knowledge, to dismiss the real and ideal things from which it is derived, and to begin with the knowledge, abstract from the things, as the ground of a higher kind of knowledge; a knowledge which is often distinctly called *Science*. Thus, for instance, without any regard to the *real* or *ideal* points, or straight lines, or circles, that originally suggested our knowledge, we can take the knowledge as the ground of knowledge to spring from it: in which proceeding, the point is not something we can see or feel, or imagine we can see or feel; the straight line is not something straight relatively to something that we can see or feel to be crooked; the circle is not the circle of the sun or of the full moon: but the point, the straight line, the circle, is separate from the times and the things that first made us know what a point is, what a straight line is, what a circle is.

Note to Section 10.

In a foregoing note (the former foot note above) we attempted a stand against the Sensationalists. We may now attempt one against the Idealists, in order, if possible, to keep the medium in which the truth is generally found. The philosophers last named inculcate, after their own manner, the old Platonic doctrine of ideas which exist originally in the mind, and give form and consistency to all the things of sense. This is an extreme, which, inasmuch as it is *un*proved and *un*provable, our slow steps cannot reach. Neither can we see any necessity for supposing these ideas; while we admit, on the other hand, against the Sensationalists, that the things of sense could give us nothing but sensations, if there existed not a distinct power, or distinct powers, through which we have *knowledge* also; that is, through which we are aware how the things producing sensation, stand related to ourselves, and (still with relation to ourselves) stand related to each other. We admit, (with an eminent English Idealist,) that sensations are not TRANSformed into ideas; (See Whewell's Philosophy of the Inductive Sciences, Aphorisms concerning Ideas;) and we admit, (stipulating for our own mode of interpretation,) that they are INformed, namely, that they are received by the understanding in order to take the character of knowledge; our objection to the theory of ideas as a mode of accounting for the fact, being this, that, inasmuch as it is a gratuitous doctrine, it

carries mystery with it, such as, we think, must leave good common sense unsatisfied, while it has a *prestige* for minds that love the marvellous. In short, we admit thus much, and no more,—that the things of sense are adapted to reach man's intellect through his senses, and that his intellect is adapted to receive them; that is, to be aware of the relations in which they stand to each other, but always with a regard to himself, created as he is to understand them in an appointed way: a statement which will appear the more reasonable, by reflecting that among these things he is placed, and among these only, during his present state of existence.

But, say the Idealists, there are ideas that form the things of sense, for which we in vain seek the originals in the outward world. Let us take one of these ideas to serve for the rest, and see how, with our views, we can explain its existence;—let it be the idea (as it is called) of a straight line. Now, we admit that there is no line in nature which we can prove to be straight, nay that there is no line in nature which probably *is* straight, and consequently that no idea, in our sense of the word idea, namely, a mental transcript of the outward thing, reflects to us that which is certainly straight. Whence, then, do we obtain the knowledge of what it is to be straight, independently of these *physical* conditions;—whence, in other words, do we get at the *metaphysical* straight line? We answer, that the fact is sufficiently interpreted when we admit, what surely cannot be denied, that all knowledge is abstract, and consequently free from physical conditions. And our knowledge of the special fact before us thus begins:—we have before us a line which is sensibly crooked, and another which, relatively to the former, is straight. Our original knowledge of the straight, is therefore the *relatively* straight. But this original knowledge becomes an abstraction by merely setting aside all the particular instances which led to it: and then our knowledge is expressed by this definition, that a straight line is a line which is not crooked. In this way, though our knowledge began with the *relatively* straight, we are able to speak of what is straight *absolutely*; but we speak of it in words only: the thing itself is unknown, either as existing, or possible to exist. How, again say the Idealists, could you speak of the *absolutely* straight, unless the previous *idea* (in their sense of *idea*) existed in the mind? We answer, that we are able to do so, by a repetition of the process which has just been indicated. To the human understanding nothing absolute exists in reality, but the *relatively* absolute. But the abstraction of that knowledge exists. In calling this abstraction an *idea*, Kant and the other Idealists dwell upon the fact, and make much out of the fact, that it lies beyond the limits of time and space. This of course we do not deny. We object only to the *mystery* of their explanation. Let it be admitted that a metaphysical straight line exists only in our knowledge of what a straight line is, namely, a line that is not crooked: to such knowledge it matters not whether the thing exists or not. The knowledge, however, is re-applicable to every line which is straight to our senses, that is, *relatively* straight: if it were not so re-applicable, it would be an *empty* abstraction, of no use but to darken understanding with the appearance of knowledge.

PRACTICAL REMARKS BASED ON THE FOREGOING THEORY.

11. The use of words to fix our knowledge, and carry it onward to further knowledge, is the true process of inductive logic; but it too often happens that words are used to hide the want of knowledge not only from others, but even from the thinker himself. The education which is conducted through the medium of books, makes a young person familiar with words, far more rapidly than he can become acquainted with things: nor would there be mischief in this, if he were aware of his real ignorance,—if he regarded the words which he hears, or reads, or repeats by rote, as signs, to a very great extent, not of what he yet knows, but of what he has to learn. The danger is, that he will deceive both himself and others, by mistaking his familiarity with the signs of knowledge, for the knowledge itself. Nor can anything be said to warn him against this error, which has not often been said before,—the common sense of mankind, independently of theory, having prescribed to the young student, from time immemorial, the duty of asking himself what meaning he has with every word he uses, or professes to understand; and the necessity of betaking himself to the ordinary ways of learning, when his knowledge falls short of his language. One powerful method of bringing him to a consciousness of his deficiencies in the inductive process of logic, will be, to require from him proofs of his knowledge in deductive essays or *themes;* the nature and methods of which are to be spoken of hereafter. These essays, it is expected, will be an occasion of frequently sending him back to the inductive process, to supply what has been unconsciously omitted. In the meantime, he may be saved from a great deal of fruitless use of words, by attention to the following considerations:

12. All unrevealed knowledge springs originally from the things of sense; and though in its nature abstract from those things, its truth or reality can be tested only by its re-applicability to those things. By our own experience (meaning of course the experience of our kind) we can know nothing beyond these things; and though it is the height of presumption to believe that nothing beyond our experience remains to be known, yet it is almost equal presumption to pretend that we do or can of ourselves know more. Into such presumption,

however, we are often led, by the empty abstractions which language generates. Language enables us to talk and even think with little knowledge, with less knowledge, and even beyond this, with no knowledge at all. The error, in any of its degrees, arises out of the power of abstracting knowledge from realities; and, in its extreme, it will always be found to consist in using a sign where nothing at all is signified, except our inability to carry our knowledge further. We must go back to our previous theory in order to make this general caution properly understood.

13. In the metaphysics of quantity, we are saved from wandering among proofless abstractions, by the constant applicability of those abstractions to the things of sense; and during the progress of our learning, we are, at every step, reminded of the connection between the two,—for instance, between the metaphysical point, or line, or circle, and every *real* point, line, or circle,—by the sensible or ideal representation we carry with us.

14. So likewise in making *red*, or *John*, or *man*, the subject of our thoughts,—although each word corresponds immediately with an abstraction, yet we are saved from inutility of thought, by the constant re-occurrence to our senses of the individual things from which our knowledge is derived, and to which the word is immediately re-applicable, so as to prevent the danger of supposing we know what we are partially or wholly ignorant of.

15. Such, however, is the mechanism of language, that a word may not only signify the abstract knowledge of a real thing, or real things, (and this is what every word must signify if it signifies anything, because knowledge is by its nature abstract from the thing known,) but the word, before it descends to the real thing or things, may be the name of an abstraction, which abstraction, if it means anything, means the knowledge of the real things which suggested it. Let the following be our example of the manner in which this double abstraction takes place. Suppose the word *Proud* to have been originally a proper name applied to an individual from his known character:—no delusion of thought is likely to arise while the word is so applied and understood:—Suppose, in the second place, that the word is used adjectively before the proper name of another person, as *proud John;* in which

application the word indicates that *John* and the former person are understood to agree in character: again, no delusion of thought is likely to arise; for though we may, for a moment, have understood, under the word *proud*, something separate from *John*, yet the grammatical form of the word will have prevented our resting in that separate meaning beyond the first moment: on the junction of the two words, we understand them as one name for one thing, and are in no danger of confounding the metaphysical separation and distinctness, with a real distinctness,—of supposing, for an instant, because *proud* and *John* are two words, that *John* is resolvable into two correspondent things. But when, without any change in the logical import, we change the grammatical function of the word,—when instead of *proud* we say *pride*, we take the word away from that which would realize its meaning. and render it not merely the sign of abstract knowledge, but the *name of an abstraction*, and we have, in consequence, to descend a step lower before we get to the realities which that abstraction includes, or ought to include, as the things known by it. Now, the danger is, that the thinker or reasoner may never have begun with, or may never go back to take, this lower step; that he may discourse to himself or others concerning pride,—"passion, or apathy, or glory, or shame,"—without knowing by experience precisely what he means; in which case, his discourse must be "vain wisdom all, and false philosophy." *

16. It is further to be remembered, by way of caution, that the forms of language into which abstract names are joined, contribute in no small degree to a delusive use of words in the acquirement of knowledge. We speak, for instance, of *the pride of John*, or *John's pride;* of *pride belonging to John*, or *John possessing pride*, in phrases of the same form as when

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* Others apart (other devils) sat on a hill retired,
In thoughts more elevate, and reasoned high
Of Providence, Foreknowledge, Will, and Fate,
Fixed-fate, Free-will, Foreknowledge-absolute,
And found no end, in wandering mazes lost:
Of Good and Evil much they argued then,
Of Happiness and final Misery,
Passion, and Apathy, and Glory, and Shame;
Vain wisdom all, and false philosophy!
Par. Lost, B. II.

we say *the brother of John*, or *John's brother*; of *houses belonging to John*, or *John possessing houses*. It cannot but be evident that such similarity of phrase must have the effect of misleading a thinker, who trusts to the forms of language, and is not in the habit of considering the things to which those forms are applied. In the instances before us, we have to remember, that there is no such real thing as pride distinct from John, and persons like John in character; but that there are such real things as the brother of John, and the houses belonging to John, distinct from John himself: that is to say, pride is a thing metaphysical or abstract, but John's brother, and John's houses, are realities.

17. Suppose, in the next place, that there is nothing within the reach of our human powers to which a word or phrase is applicable, the proper interpretation of such word or phrase when attempted to be so applied, is, that it stands as the sign of our *ignorance*. When we say infinite or endless space, infinite or endless time, all we know or can know of those things, is, space endless *relatively* to ourselves, time endless *relatively* to ourselves: what time or space may be beyond our experience of what it has been, and what it continues to be, we know not: we can take the known portions of time or of space, and think of such portions as still going on; but this is time or space *unended*, and not *endless*, unless, as before said, we understand *endless* to mean *relatively* to ourselves; that is, only so far as our race can have experience. The same reasoning belongs to such words as absolute, perfect, complete: we know nothing, and can know nothing but the *relatively* absolute, the *relatively* perfect, the *relatively* complete. We are justified, nevertheless, in applying these words to the Divine Being; but let it be remembered that when so employed they do not bring the nature of that Being within the reach of our faculties: they say, if they say anything, that however well we may understand what it is to be absolute and perfect when things of sense are in question, we apply the words in reverence only, without pretence to knowledge, when we apply them to God:* we use them as signs that represent what in merely human science, is unknown and unknowable; and so

* See Whately's Logic (*Ambiguity of "same"—Logomachy*, &c. Book IV. c. v. § 1) in confirmation of this point of view.

used, they are serviceable elements in the structure of human language. This indeed is the only way in which empty abstractions, that is, abstractions which throw realities quite out of question, can be legitimately used: and our system of inductive logic having reached this point, makes no pretence to go beyond it.

Note to Section 17.

And just where we leave off, METAPHYSICS, in their usual form and purpose, begin; especially the Metaphysics of Germany. The strength of the systems which arise in that country of interminable speculation, consists in their being *unprovable:* for how shall we set about disproving that, which, as it lies beyond the reach of proof, is equally beyond the reach of contradiction. The German philosophers employ the abstractions, all of which are obtained originally from the things of sense, to interpret things which lie completely beyond our present state of existence. So employed and so applied, they are hypotheses; and if it were possible to establish them by inductive proofs, we might accept them on credit till the proofs were added. But the proofs are impossible, and the demand is preposterous that we shall accept mere supposition for science. Call these systems romances, and we may dip into them, perhaps, without danger. That they are nothing more, is evidenced by the fact, that one of them is no sooner promulgated, than it gives occasion to another to dispute its pretension, Kant is succeeded by Fichté, Fichté by Schelling, Schelling by Hegel: a kaleidoscope has not more shapes for the eye, than metaphysics for the German mind. The mischief is, that these systems pretend to be more than romances: they pretend to carry the human intellect into the impenetrable unknown which everywhere surrounds us. A lively faith can irradiate this unknown with a light from itself, and take away all its gloom, without pretending to see into it with the eyes of human reason: but these metaphysical romancers come with false lights, offering what they call *science* in place of *faith.* "To-morrow," Fichté is reported to have said, in the adjournment of the next point of his lecture, "to-morrow we shall create God." Had his pretence been only to offer a romance, the announcement, though profane, would have been harmless; for who, as he proceeded, would have been ready to say, "I believe in Fichté, the maker of God?"

RECAPITULATION OF DISTINCTIONS AND DIFFERENCES.

18. All knowledge is abstract, that is, separate, and of a different nature, from the things that originally suggest it. These things are real things, the things of sense; and the way in which we unavoidably understand them, is, that they exist distinctly from oneself. But beside *real* things, there are things *ideal*, and things *metaphysical*, which become the subjects of knowledge.

19. Ideal things are those which we imagine to exist dis-

tinctly from oneself, by a voluntary delusion which our better knowledge can at any time set aside ; as a fairy, a gorgon, Lilliput. Of ideal things, some are altogether fanciful ; but others are more or less accurate representations of real things that are, or have been ; as, London, Adam, Leviathan, Babylon.

20. A thing metaphysical is a state of one's thinking self, which state we can make the subject of higher knowledge. It is different both from real and ideal things, though liable to be confounded with them. Thus the metaphysical straight line or circle, the moment it is realized, or imagined, ceases to be metaphysical. Thus, though we can personify *Virtue* or *Pride*, we cannot in any other way think of pride or of virtue as having real existence. But we can know what *virtue* is, and what *pride* is : that is, we can know a certain state of one's thinking self as having been a state of previous knowledge, —the knowledge that such and such men acted in a certain manner, so as to be approved in the one case,—to offend in a certain way in the other. If indeed we have no such previous knowledge, and yet talk of *virtue* or of *pride*, the words are empty names that only serve to conceal ignorance.

21. All words that are parts of speech are signs of things metaphysical. But some of them can be immediately applied as names of things real, or ideal ; while others can be applied only as names of things metaphysical. Thus the name *John*, the name of a familiar friend, although it signifies our knowledge of him abstractly from all the circumstances under which we have known him, can be re-applied to him in connection with any circumstances under which we may know him again. Thus the name *man*, the name of any one of our species, although it signifies our knowledge of what our species is, abstractly from any one of our species, can be re-applied to any one of that species. But the name *virtue* or *pride* cannot be applied to any thing real, or to any thing ideal, except by poetical personification : it can be applied only as the name of previous knowledge, and if we have not the previous knowledge, it is an empty name.

Hence, then, there are names of things *real*, of things *ideal*, and of things *abstract* or metaphysical.

22. In Grammar, it was found useful to borrow from Logic the distinction of names into Names proper, common, and abstract. A proper name is a name immediately applicable

to some one particular real or ideal person or thing; as, *John*, *London*, *Jupiter*, *Lilliput*. A common name is a name that can be immediately applied to a person or thing, with reference, at the same time, to the class or kind of things to which the person or thing belongs, whether real or ideal; as *man*, *fairy*. A name abstract is a name not applicable to a real or ideal person or thing, (except by personification,) but only to a state of knowledge, under which we apprehend something concerning real or ideal persons or things; as *virtue*, *pride*. But a name abstract may become a name common if we make it a name for several states of knowledge, Thus, the name *virtue* may be a common name for the special virtues, *Prudence*, *Justice*, *Temperance*, *Fortitude*; or *Faith*, *Hope*, *Charity*.

23. Language is the instrument of reason by which we collect knowledge, so that it shall be ready for re-application to the things known. In order to serve its purpose, language is very flexible; and the logician, in availing himself of the changeable import of a word, has to notice, 1. Its Etymological sense: 2. Its General sense: 3. And its Particular or Applied senses.

24. The etymological sense of a word is its original sense, so far as we are able to trace it. Thus the original sense of *To prevent* is to go before; the original sense of a *villain*, is one who lives in a vill or small town; the original meaning of a *regiment*, is rule or command, or something ruled, or commanded; the original meaning of the word *thing*, is that concerning which we *think*.

25. The general sense of a word is that which includes under it all more particular or special senses. Sometimes this coincides with the etymological sense; as *regiment* when it means every thing that is ruled or commanded, which sense will include the special object, a body of soldiers commanded by a colonel. The general sense of the word *man*, is that which includes every human being, male and female, in every stage of life. The general meaning of *animal*, is that which includes every organized being that is liable to sensations of pleasure and pain; the general meaning of the word *plant*, is that which includes every organized being that is destitute of sensation. The general meaning of the word *sensation* is that which includes every effect, pleasurable, indifferent, or painful, which reaches the brain of an animal by the operation of an

external cause.* The general meaning of the word *thing* is that which includes every possible subject of our thoughts, real, ideal, and metaphysical; and this general sense coincides with the etymological sense.

26. The special sense† of a word, is some limited application deduced or deducible from its general sense. Thus the name *man* may be specially applied to any human being not a female, nor a boy or infant. Thus the word *animal* is sometimes applied to a brute animal only. Thus the word *regiment* while it had a general meaning, was often specially applied to a body of soldiers commanded by a colonel: which special meaning has now become the common meaning, and the general meaning is now almost forgotten.

27. In the use of signs to advance and fix knowledge, it appears that there may occur abstraction, generalization, and specialization.

28. Abstraction is the separation of knowledge from the thing known. It is the beginning of knowledge, there being no such thing as knowledge till abstraction takes place. And abstraction is carried on by the use of language. The word *John*, may have first meant, *John, an infant, lying in his nurse's lap.* But when we know *John* under other circumstances, our knowledge of him is abstract, that is separate from those circumstances: and not only is *John* the sign of abstraction from the particular circumstances, but every other word which helps to form the description of *John*, is also the sign of abstraction from particular circumstances.

29. Generalization is the process of abstraction by means of a name made common to two individuals, and applied successively to more individuals, till we have included under it all we find useful to include. Thus the word *man* may have first meant a single individual, and then it was a proper name. It may then have been applied indifferently to two individuals by excluding what was peculiar to each. And so it continued to be applied to three, four, five, &c.; till it became a name for any individual of the human kind.

30. Specialization‡ is the opposite of generalization, and

* That is, external as regards the brain.

† In Aristotelian logic, any special sense of a word is called *a second intention.*

‡ J. Stuart Mill is the originator of this useful philosophical term.

properly belongs to deductive logic, because the ordinary way to make a word special, is to join to it words that have that effect. Thus the word *man* is, made partially special, when we say, "a short old *man* in a brown coat."* But a single word is sometimes made to take a special meaning deduced from a meaning more general; as the word *doctor*, whose general and etymological meaning, is, a learned man; but which sometimes means, specially, a man to whom the diploma of a degree bearing that name has been given by a university; and sometimes, in common or vulgar use, one who undertakes to cure diseases, whether he has received a university diploma or not. A general word thus made special, is an instrument of inductive logic, as well as all other single words.

Suggestions for avoiding, during the Inductive Process, the delusions of the Rhetorical Sophist.

31. Sophistry is an unfair use of art in Rhetoric, in order, for some partial end, "to make the worse appear the better cause." The delusion, indeed, is not always designed, the rhetorician as frequently cheating himself before he sets about misleading others. But this makes no difference as to the likely prejudicial effect; and our learner has to be warned against this effect, while pursuing (what every one pursues, right or wrong, during his life,)—the logical process by which knowledge is stored up for subsequent development.

32. One common means of delusion, and the first we may mention, because it will be the first against which the logician will be warned in his own deductive use of language, is *the use of high-sounding verbiage*. He has already been cautioned on this point, particularly in Sections 11 and 12 preceding; but the caution cannot be too often repeated. It is again urged in this place, because, when a point cannot be otherwise carried, the rhetorician often addresses the ignorance of his hearers, offering them sound for sense,—the empty parade of learned terms for the substance of learning. Even the substance becomes a snare when used to bewilder the understanding of the hearer or reader, and keep him from

* For the single word is not special in meaning; but it merges its single meaning in the logical noun it helps to construct; and the meaning of this logical noun is special.

inquiring after truth in the true direction. Thus the quack makes a parade of medical knowledge, in order that you may take his pill, which has been prepared, he is well aware, quite independently of such knowledge; and thus a rogue, as the novelist shows, displays a single piece of learning, got by rote, whenever he meets with one who is likely to be a new dupe, through the reverence in which we are disposed to hold a learned man.

32. Akin to the means of delusion just mentioned, is *the parade of logical forms*. This indeed is not so practicable a snare since the formal logic of Aristotle has been less in repute; but that it is still used with effect on some occasions will appear from a few examples in the 10th Section of Chapter V. In the mean time, we have to assure *our* scholar, that the *form* in which a piece of reasoning may be couched, is never a security that the reasoning is just, nor a defect in the form an evidence that the reasoning is false. To say that, "All projectors are unfit to be trusted; this man is a projector; therefore he is unfit to be trusted,"—will never convince a sensible thinker, while he admits all habitual projectors to be untrustworthy, that a prudent man who now and then comes forward with a feasible project, is a man unfit to be trusted. And to say, "All wise legislators suit their laws to the genius of their country; Solon did this; therefore he was a wise legislator,"—will not prevent him who reasons by *means* of words, and not *with* words, from *receiving* the reasoning as quite correct, although the Aristotelian *form* of reasoning fails.* Neither when the argument for the existence of a God from its being universally believed, is met by the instance of a nation destitute of such belief, will *our* scholar be more, we think he will be much less, in danger than the Aristotelian of allowing the objector to go further than his objection warrants, by asserting, namely, that because the existence of a God is not universally believed, all argument for the existence of a God is set aside. In any case like this, which demands nothing more than efforts of the natural understanding operating by *means* of words, but not using them in place of thought, to talk to *our* scholar of being on his guard against

* Both examples will be taken up again in Chapter V., (Sections 9 and 10,) and the true character of their faultiness explained.

an illicit process of the major term,* would be to prepare him for being operated upon, when *off* his guard, by such means of delusion as it is the object of this section to characterize.

33.† The next means of rhetorical delusion which may be mentioned, is a means very much in use at the present day, that of appending to *an abstract or general proposition*, every special practical inference which it may suit the views of the reasoner to draw from it. Thus, it having been said, and, in general terms, safely said, that wholesome food is food fit for our species; and a certain article of food having been found wholesome by such and such a people, we are required to act on the general admission, and force its use on a different people. Now the proof that it is wholesome does not reach further than the experimented instances, and our general admission cannot fairly be extended to such an issue. With regard to people who live in another climate, or under any other different circumstances, the proof is yet to come, and till it come, the issue proposed is a practical *non-sequitur;*

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* See Whately's Logic, Book III. § 7.

† A great part of what follows in the remaining four sections under the present head, though not literally quoted from, is suggested by the excellent matter contained in Dr. Whately's Chapter or Book on Fallacies (referred to in the previous note). That the author of this Manual has not been able to draw greater benefit from the chapter in question, is caused, as he thinks, by the mischievous interference in it of Aristotelian principles. If Dr. Whately had not predetermined to be more consistent than his fellow Aristotelians, if, like them, he had given up the doctrine of the formal syllogism when he came to treat on fallacies, and spoken of them in the language of common sense, the Chapter, which is now excellent only in parts, would have been excellent as a whole. But Dr. Whately, (unfortunately as the author thinks,) does his utmost to reconcile this part of his logic with what precedes, chiding his brethren for having here renounced their science. "Whenever," he says, "they have to treat of anything that is beyond the mere elements of logic, they totally lay aside all reference to the principles they have been occupied in establishing and explaining, and have recourse to a loose, vague, and popular kind of language." (Introd. Book III.) The effect of Dr. Whately's greater consistency appears to be this,—that in endeavouring to draw a line between logical and non-logical fallacies,—between what can be explained on the principles of Aristotle, and what must be explained according to common sense, he very much mystifies the latter mode of explanation, while he is obliged to draw his intended line in so zig-zag a way, that, for whatever purpose, one cannot help thinking it had better not have been drawn at all.

a case of having *proved too little.** Again; we may allow that every one has a natural claim to be free; but the admission of this in the abstract, does not bind us to join in every special act which it may be cited to justify. Employed in this way, it is an argument that *proves too much;** for with lax unconditional interpretation, it necessitates the freedom of madmen, and of infants or idiots. Again; we may very safely admit that a Representative is one who represents others; but from this general admission, it can never be inferred in what particular manner he is bound to represent them; it may be as their messenger, it may be as their spokesman, it may be as their delegate with special restricted powers, it may be as the member of a legislative assembly. What are his duties in any case or capacity whatever, will evidently be undeterminable by the general signification of the word: to ascertain these duties, we must ask in what way, by prescription, or law, or usage, or power specially held and specially granted, he is required to act.—These three examples may stand for many others that might be given, involving such abstract terms as Socialism, Communism, Equality, Fraternity. We may admit the justness of general definitions drawn from these and similar words; but we are not bound to join in following out the definition into practical consequences when we have no test from experience or custom to warrant our proceedings.

34. Another means of rhetorical delusion, is that of shifting from one sense of a word or a proposition to another, so as to lead the logician, in his inductive progress, to admit the conclusion of the one sense, as the conclusion of the other. This delusion often takes place in thought, without any exterior cause, other than the equivocal character of the word. "Thus," says Dr. Whately, "a young divine perceives the truth of the maxim, that for the lower orders one's language cannot be too *plain*, that is, clear and perspicuous, so as to require no learning nor ingenuity to understand it:—when he proceeds to practice, the word *plain* indistinctly flits before him, as it were, and checks him in the use of ornaments of style, such as metaphor, epithet, antithesis, &c.; which are opposed to *plainness* in a totally different sense of the word."—

* See Chapter V. Sections 11, 12.

Hence, in many instances, "a dry and bald style, which has no advantage in point of perspicuity, and is least of all suited to the taste of the vulgar." (Book III. § 5.)—The next example is also from Dr. Whately, though with different arrangement. In saying, "He who necessarily goes or stays," we may mean—*he who goes of necessity, or stays of necessity*: Or we may mean this alternative, that *he must either go or stay as his will may determine.* Now the person under the former description is evidently not a free agent; but the person under the latter has all the freedom which we can attribute to a free agent. The sophist may, however, so conceal his transition from one of these two meanings to the other, as to get an admission of the doctrine of universal absolute necessity, the doctrine which insists that no man is, in any case, a free agent.

35. A further means of rhetorical delusion is that of making a conclusion which is true of an aggregate, appear to be true of the particulars of the aggregate; or the reverse of this. We need not notice the former mode at present, because it can hardly be practised successfully on one who is not trammelled by the forms of the Aristotelian syllogism, a caution against the false forms of which has already been given above (Section 32); and also because an occasion will occur for exhibiting some examples in Chapter V. (Section 10.) But the reverse of this mode of delusion may be here noticed, namely, that of making a conclusion which is true of the particulars of an aggregate, appear to be true of the aggregate. Now there can hardly be a delusion in so plain a case as the following:—we conclude, or more properly infer, when, in throwing dice, a person casts two sixes now and then, that he does so by what we call chance or good fortune; but if he casts two sixes fifty or a hundred times running, we can hardly be driven or seduced into the same inference, reason guided by experience teaching us, in such case, some very different inference. Yet in cases not dissimilar, a hearer or reader may, by a juggle, be led away from this natural procedure of the understanding. Let our example take the form of a dialogue; only, be it observed, the events supposed in it are prospective, not determined. "Tom, I would advise you to resign your place immediately." "What, in order that you may be promoted to it?" "No, not for that reason, though

I am the next to succeed you; but because of some news I have just learned, that you will be placed in a much better situation, if when it is vacant, you are in a condition to have it offered to you." "How so?" "Why A. B. is so ill that his doctors say he cannot live a month." "And what then?" "Why his office being vacant, will be eligible for you, if, which you know is an established proviso, you are not in place at the time." "But there are others for whom it will also be eligible." "Yes, but they are only a few; and, doubtless, your uncle will, by that time, be returned from America, who has interest sufficient to make your superior qualifications properly understood. With all these *concurrent* probabilities in your favour, I do say you must get this place, if you resign that which would decidedly prevent you from it." Now, if without regard to further considerations, such as the possibly very low value of the one place and very high value of the other, Tom should, on this representation, give up his place, he would be guilty of a practical non-sequitur—of being deluded in a case of *having proved too little*. The sophist speaks of *concurrent* probabilities, as if, in the *aggregate*, they made up a *greater* probability, when the fact is, that the number of the probabilities diminishes the value of each as regards the issue of the aggregate, so that the value of the whole must be calculated inversely to their number.

36. Perhaps the remaining means of rhetorical delusion, may be summed up by saying that they are all carried on with the purpose of keeping out of sight, as much as possible, the particular point or points to which attention is required, for the purpose of reaching the truth that stands opposed to the immediate interests of the sophist. If any accredited book of rhetoric had systematized the particular means of carrying out such a purpose, it would be the business of logic to oppose, for the benefit of its inductive learner, a correspondent arrangement of means to avoid the several snares. But whatever may be the corruption of our nature in *practice*, we are not so lost as to tolerate such a system in *theory*, any more than we tolerate a written art of poisoning or of seduction. As, therefore, there is no system to oppose, there will be very little system in the observations which follow. It cannot be doubted, however, that unscrupulous persons who have partial ends to carry, do find too easily, without express instruc-

tion, the means to their purpose: and it is for us to meet these artifices, if not by instruction directed against each means in detail, yet by general remarks which may indicate their common character, and how they are designed to operate. Now, the ordinary plan of calling off attention from an important *questionable* point, is, to refer to it as a point *not* questioned among the select well-informed class of persons who are presumed to be the leaders of opinion. By this plan, a modest hearer or reader, not included, by his own modesty, in the class, may doubt the extent of his information, so as to suppose that he has not reached the knowledge which persons of that select class enjoy. The plan here spoken of, may be carried out variously. First, for example, the questionable point may be delayed till the end of a long preliminary discourse, a discourse not at all touching the particular point, but dwelling on unquestionable generalities, advanced, all along, on the understanding that they involve the particular point yet to come; which point, when it comes, is stated as a thing of course, that all persons of competent information have already admitted. Or, secondly, the questionable point may be mingled with another, about which there is no question; and the two may be so shifted that at last they seem one, and a conclusion may be insisted on which carries the questionable point, though it truly carries only the other. Or, thirdly, the questionable point may be so put to the hearer or reader in the very form of a question, that if he is seduced to answer it according to the form in which it is proposed, and not according to the form in which the truth requires it to be proposed, namely as being true or false, he must give an answer suitable to the views of the sophist. Or, fourthly, a series of cases may be proposed, as being all the cases to which, respectively, an answer can be given; when there remains another case appertaining to the point at issue, by omitting which, the sophist secures a triumphant answer in favour of what it is his interest to prove. Moreover, any of these methods may receive considerable assistance from the tone or style of the rhetorical reasoner; a tone or style indicating his connection with a high grade of thinkers, and a disparagement of those who, by their way of thinking, prove themselves not to belong to the same high class.—Some examples of these several observations (they

must be hypothetical) may be necessary. Suppose the sophist desires to establish, in the minds of his hearers or readers, the questionable fact that a certain minister of state is corrupt: using the means first indicated, he holds a long preliminary discourse on the baseness of those who, being in places of high political trust, abuse their power to serve their private ends; and exciting in this manner a strong virtuous indignation, without pointing to any person in particular as the object of it, he asks, at last, *not* whether A. B. is a man that deserves this indignation, but assumes that he *is known* to deserve it, except by people who are shut out, by their station, from being acquainted with what is done in high places (not saying so in words, but implying as much by his tone or style); and thus, if his hearers or readers are not on their guard against the delusion, he gains his point, by keeping them from the only inquiry which truth obliges them to institute. Suppose another instance for our first case :—it suits the sophist to fix it as a fact in his hearers' or readers' minds, that a certain root is not a cheap article of food. To all people of common sense, this would appear an affair of mere calculation. Accordingly, the sophist begins with calculations, elaborate and accurate, of the produce per acre of this article of food and of the other, sliding in, somewhere, as a point known and admitted in science, that the root in question contains but a tenth part of the nutritive matter which exists in the substances opposed to it. Now it is evident that all the previous calculations will most likely amount to nothing, unless the last point is clearly established, but instead of establishing it, the reasoner, by such an artifice as this, may contrive to make it pass for granted, and thus his object is gained.—Suppose further, in order to elucidate the second means of sophistry indicated above, that the rhetorician wishes his hearers or readers to admit the necessity of transporting criminals to a foreign colony ;—he might mingle this questionable point with one concerning which there is no question, namely that it is necessary to repress crime in the parent country; when, by passing frequently, in a long discourse, from one to the other of these two questions, he might succeed in making them seem one; that is, in making it appear that the *only* way of repressing crime in the parent country, is the transportation of its felons to the infant settle-

ment.—Suppose once more, in order to elucidate the third means of sophistry which the previous remarks hint at, that the sophist wishes to establish it as a fact, that A. B. evaded, by a trick, the full payment of his just debts;—instead of setting his hearers or readers to inquire whether such *was* the fact, he may ask whether any one of them recollects the *date* of the fact. Or, in order to elucidate the fourth means of sophistry spoken of above, suppose the fact to be known that A. B. did compromise with his creditors, but the question to remain, whether it was through dishonesty, or imprudence, or unavoidable misfortune,—the sophist may stop his hearers or readers from inquiring into the probability of the last cause, by asking whether it was through dishonesty or imprudence, shutting out, by this only alternative, the thought of any other:—And, lastly, as to the power of a certain tone or style of speaking in eluding a questionable point, we may suppose, for our example, a sincere holder of some religious tenet, to be thrown among unbelievers. A sophist from among these, instead of asking the grounds of the belief which he wishes to undermine, and opposing them by direct argument, may, by speaking of them with banter and contempt as not worth an argument, gain the end which he could not have reached by a direct road.

CHAPTER III.

DEFINITION.

1. Definition is the act of so fixing the limits of a term, that nothing more nor less than it is intended to signify at the time, shall be included in it. It is an art growing out of the use of language, and possible only by having words to operate with, or signs equivalent to words. Its general purpose is, to assist the natural understanding; and this it accomplishes by subjecting all the knowledge acquired by it to one single relation, not permanently to take place of those unnumbered relations under which the things we live among are apprehended, (for this would be not to assist our knowledge—it would be to supplant it,) but that, in the inductive and deductive process, we may stop at convenient stages, and fix, and connect, and arrange, by the one pervading relation, the

whole of what we know, whether for the purpose of going on to increase our stock, or of developing the stock acquired. The art we speak of, is an essential part of formal logic, and a most important part of ours. The formal syllogism,—that which works by extremes and middle term,—would, without it, have been an impossible construction; and with regard to our logic, though it can, in a certain degree or condition, exist without it, and does so exist in the practice of uneducated people, yet, in such condition, it has no claim to rank higher than the many ordinary arts which we learn and practise without express instruction. We therefore willingly accept, from formal logic, this part of its doctrine,—the only part of it which is truly useful.

Theory of Logical Definition.

2. We have seen in the previous chapter, (sect. 25,) that the power of a name to extend its comprehensiveness, has no limits but the want of further things to receive its meaning; and hence we have names, as *thing*, *being*, which include every possible subject of thought.* And if we have names thus comprehensive, the same process which led up to these, will have produced others of less and less degrees of comprehensiveness, till the names are those on which the process has not yet been tried, that is to say, proper names, or the names of individuals. As the process consists in superinducing a relation upon the results of the natural understanding, and therefore is an artificial process, so, though the principle is always the same, there are great differences of detail in applying it. For instance, almost every transcendentalist has his own set of categories, the *summa genera* under which he is led, by the character of his inductive studies, to marshal the developments of his understanding. What these severally are, needs not be stated here: it is sufficient to say that not one of them exactly coincides with the views unfolded in this Manual, which therefore proposes its own categories, namely

* Except *nothing* or *not-being;* a name which, shadowy as it is, still keeps the fact present, that wherever there is knowledge, there must be, under it, the thing known, and the thing by which it is known. Here, the former is denoted by *thing* or *being;* the latter, by *nothing*, *not-being*, or *nonentity;* or, contrarily, we know what *not-being* is, because we know what *being* is.

the distribution of all things which can be the subject of thought into *Things-physical*, and *Things-metaphysical*, the former of these subdividing into *Things-real* and *Things-ideal*. Now, as to things-ideal, since they are the counterparts or the compositions of things-real, we need not pursue them distinctly from things-real, but go on to speak of the subdivisions as equally belonging to both under their general denomination of Things-physical. There is an old division of real things into *matter* and *mind;* a division which, in our days, has been thought sufficient to warrant an inductive system of philosophy built upon the latter, so as to be distinct from the sciences professing to be concerned solely about the former. Whether this is, or is not a sound purpose, requires no discussion here: it is sufficient to assert that though the distinction on which it is founded is a most convenient one for many logical ends, it is one concerning which we can at present *know* nothing (whatever we may believe) further than that man is a being capable of constant progress in knowledge, and raised in this respect above all other creatures perceptible by his senses. We may state this fact by saying he has a *mind;* but in so stating, we do not explain, or get beyond the fact as previously stated.* Transferring, then, both *matter* and *mind*, from the place sometimes assumed for them among things-physical, to

* Be it well observed that what is here said, interferes in no degree with the Bible doctrine of man's immortality, but goes quite along with it, as far as, on human grounds, any doctrine can go. Nay, even the Platonic doctrine of the immortality of the soul, (a doctrine not identical with the Bible doctrine, though not contrary to it, and therefore, by believers, often, perhaps almost always, joined to it,) even that doctrine is not *contradicted* by what is said above, though its claim to *scientific* validity is questioned. Nor, again, do the remarks made above give any countenance to what is called *Materialism;* for if it asserts that *mind* is an abstraction, that is, not a Thing-physical but metaphysical, it asserts the same of *matter*, whose existence as a substratum or common essence of all the things of sense, is, like the other point, quite unsusceptible both of proof and disproof. Matter, as far as we can know anything about it, has its existence only in an arbitrary definition, which comprehends just so many of the things of sense as experience in physical science points out to be expedient. In the meantime what more rational to believe than that man, however assimilated to the things of sense among which he is now placed, is designed for immortality, by having means within reach for regaining the perfection of a nature that evidently struggles to raise itself above them?

what we deem their proper place, namely among things-metaphysical, we come next,—in our progress down toward individual things,—to the domains of acknowledged inductive science; and what shall here be the *summa genera* or heads of classification, depends on the judgement of those who, having experience in those wide domains, are qualified by such experience to guide others. All that logic proposes, is, to direct the *principle* of every classification, not to lay down the classification itself. That principle is easily stated. The *summum genus* or general name of the things about which the science, whatever it may be, is conversant, must be divided into subordinate heads, each of these again into sub-subordinate heads, and so on downwards till our last division brings us to the individual things by which our earliest knowledge was suggested, and for the better comprehension of which, this systematizing principle has been put in operation. The word division, be it here observed, is not, in describing the foregoing operation, used in the same sense as when used in speaking of the division of any natural substance into parts,—as for instance into halves, quarters, or eighths, and so forth,—but it is used to signify what, for common apprehension, we might better signify by the term *distribution;* distribution implying that the whole is spread out, remaining, as a whole, what it was. Our meaning above, then, otherwise stated, is, that the chief head is spread out into subordinate heads, each of these, again, into sub-subordinate heads, and so on till the lowest heads can but be spread out into the individuals of which they consist. Now it matters not what the chief head, or the subordinate heads, or the sub-subordinate heads are called;* we have only to remember that, in logic, the names employed are commonly these: *summum genus* for the chief head; *genus* for each of the heads under it; *subaltern genus* for each of the sub-subordinate heads; and for each of as many more as may be subjected to each of these; till we come to the *proximum genus*, or that next above the *species*, and then under each species we have only individuals.—Be it observed, however, that every subaltern genus is a species with relation to the genus immediately above it,

* As, for instance, instead of the names which follow above, we may use those of *Class*, *Order*, *Genus*, *Species*, *Variety*.

and therefore every such genus is a proximum genus with relation to such species.—So much for the application of the principle to physical things.—Returning now to things-metaphysical, we have this important observation to make; that as they have their existence only in the understanding, so the enunciation of them in the form of definition, must always, if the enunciation is adequate, be equivalent to the things themselves; as, for instance, the definitions of a point, a line, a circle, &c., in mathematics; the definitions of virtue, vice, pride, "passion, and apathy, and glory, and shame;" and so on with the terms of double abstraction * in whatever other science.

3. Such are the effects, described generally, of superinducing the indicated one relation upon all the knowledge which the natural understanding collects. It is this that renders logical definition possible. Uneducated persons do not define,—they describe; that is to say, when they try to convey their knowledge to others, they refer only to individual things, distinguishing these from each other by every variety of mark through which they differ to the natural understanding. And this indeed is knowledge,—the knowledge enjoyed by our species at large:—and logic in its superinduction of one universal relation to connect and arrange this knowledge, is a most useful minister to knowledge. But when, beyond this, it builds an art of reasoning upon its own arbitrary arrangement, in order to take the place of, or even to explain the natural acts of the understanding, it then becomes, so far as it can attain its purpose, a mischievous innovator instead of a useful minister. We say, *so far as it can attain its purpose;* which purpose fully attained would be, to put words artificially explained in place of thought derived from things,—to reason *with* words instead of *by means of* words. But in fact the Aristotelians never have reached this point in perfecting their art,—fortunately in one respect, but unfortunately in another; since, if it could have been carried fully out, its monstrous pretensions would have been earlier discovered. But the bulk of mankind never have been drawn into the use of their artificial syllogism; and even themselves,—nay, even in illustrating that syllogism,—have in general used informal

* See the previous chapter, sect. 15.

shapes, as suggesting meaning more readily than the strict forms of their own syllogism. Yet with these hindrances to its presumed mischievous effect, the predominance of Aristotelian logic in the schools of Europe during several ages, was accompanied by a sign sufficiently indicative of mischief somewhere, namely by activity in learning without progress and without fruit. Inquiry, during that time, moved only in a circle; and he who left his place of education at twenty years of age, was sure to find, if he visited it at sixty, the same questions going on, which employed him in his youth. When philosophy spread her wing to reach the height she is still seeking, the trammels of the Aristotelian syllogism dropped from her, whether as effect or as cause is immaterial: the fact itself is too notorious to be called in question.

Practical Distinctions and Directions grounded on the foregoing Theory.

4. Definitions are *Nominal* or *Real*. Again, real definitions are *Accidental* or *Essential*. And again, essential definitions are either *Purely-logical* or *Physico-logical*.*

5. A Nominal definition is one that is so only by name, and not in reality. Or it may be otherwise explained by saying that it does but put one name for another, on the supposition that the one substituted is more in use, and consequently better understood. Thus we may define *nonentity* by *nothing*; *innate* by *inborn*; *periphery* by *circumference*; *monologue* by *soliloquy*. In a nominal definition, only one word must be used, or if more than one, it must be such a combination as is understood in the manner of one word: for if we *collect* a meaning from two or more words, then there is a development of knowledge, and the definition is a real one.

* In this arrangement, and in the meaning of some of the terms, I have felt it necessary to deviate from Dr. Whately. He justly points out that Nominal and Real, as he, after others, explains them, furnish a distinct or cross division as regards the division into Accidental, Physical, and Logical; a fact which he complains that his brethren have overlooked,—so as to have introduced confusion and perplexity. I hope I avoid confusion by not making *Nominal* and *Real* a cross division; for I do not use the terms in the same senses as Dr. Whately, although in senses which custom fully warrants. Further, I do not follow him in the unqualified contradistinction of Physical from Logical definitions; my reasons for which may be collected from the foregoing theory.

In defining man, a *human-being*, or explaining To prevent, by the correspondent expression To *go-before*, the two words in each definition would most likely be taken as the syllables of a single word; and if so taken, the definition is a nominal one.* It is also a nominal definition, though the words may be several, which repeats the word to be explained in another grammatical shape; as when we say, Justice is the quality of being just.†

6. A Real definition, that is, a definition in reality,‡ is an explanation developed in some form of two or more words, with the effect that the thing defined is referred to some class, and the difference in some way indicated between it and the other things of its class. If we say *John is always talking of himself*, we declare a fact concerning John, but we do not use any form of definition. If, however, we say *John is a man that is always talking of himself*, we do use a loose form of definition, inasmuch as we refer our subject to his class or kind, *man*,

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* The student will bear in mind that whenever the meaning is *collected* out of words put together to suggest it, there is the logical process of premises and a conclusion. (See chapter I.) But in combinations of frequent and familiar occurrence, the logical process has become unnecessary, and of such combinations we receive the meaning at once, as we receive it from single words. The description applies to all the familiar phrases of common speech.

† A subject which is *sui generis* hardly admits other than a nominal definition; as, for instance, Time, or Space. So far as these can be understood by human faculties, every one capable of thought has a full understanding of them: to explain them to one who did not already know what they are, would be impossible. We may say, Time is the measure of duration; Space is the measure of extent: but a clock, and a surveyor's rod, would, with almost as much propriety, come under these definitions; though the one is better called a measurer of time, (chronometer,) and the other a measurer of space, (chorometer.) Perhaps, the nearest approach we can make to a real definition of time, is, "That which exists between, and co-exists with events:"—and of space, "That which is occupied by the tangible things of sense, (or deemed tangible,) and exists where they are not." Kant denies the *objectivity* of time and space, making them parts of the mind itself,—receptacles into which the matter is poured, which the understanding subsequently *forms* into the things of the material universe. We may safely leave this dogma to the fate of German metaphysics in general, contradicting, as it does, a conviction quite as strong as that which attaches to all other things that we deem external.

‡ For, be it observed, *real* is not here used in the restricted sense assigned to it when we oppose it to *ideal*, but in its common and looser sense.

and then indicate the difference between him and men in general. Every form of real definition, strict or loose, has these two parts, namely kind and difference. Thus in defining man *a rational animal*, the latter term *animal* implies the kind or *genus*, and *rational* the difference, which is here called the *specific difference*.

7. An Accidental definition, commonly called a description, is that which explains a thing by its properties or accidents. Now a property is something which uniformly belongs to a subject, but is not so present to the understanding as to be thought at the moment essential, however it may be so. We say, for instance, that it is the property of a triangle, (not its essence,) to have its three angles equal to two right angles, but that it is its essence, (not its property,) to have three sides. An accident differs from a property by being separable from a subject; as for instance, to be right, or obtuse, or acute, is separable from the subject angle, in its general sense; in other words we may say, that to be right, obtuse, or acute, is accidental to an angle generally, though essential to each species. So when we define or describe John as *a man that is always talking of himself*, we describe him by what is accidental to his kind, though essential to John's special character. But we might go on describing him by accidents that are not essential, as for instance, that he lives in such a place, keeps such and such company, and so forth; all of which may form parts in our definition or description, and all belong to what is called an Accidental definition. We have next, however, to observe, that though we can define or describe an individual thing by what are purely accidental to it, as when we describe an individual plant by saying it is *a rose-bush growing at the farther end of the south-wall, and now in full blossom*, yet we cannot so define or describe a kind of thing: we then, in order to form an accidental definition or description, have recourse to the *properties* of the kind: as, for instance, in describing what a plant is, (that is to say, *any* plant, not a particular or individual plant,) we may say that it is *a natural production growing out of the earth from a seed or a root, very various in size, colour, and form, having within it a principle of life, and decaying when that principle is no longer active.* The description might be lengthened to any extent by adding other properties of plants; and the whole would be an accidental definition.

8. An Essential definition is one that limits its subject to that extent, neither more nor less, to which we design to adhere, in our subsequent inductive or deductive process; a purpose which it accomplishes by adding to its proximum genus, its specific (or characteristic) difference. Thus we define a square by calling it an *equilateral rectangle;* where rectangle is the proximum genus, and equilateral the specific difference; and, in a similar manner we define man by calling him *a rational animal.* An Essential definition is either Purely-logical or Physico-logical; purely logical when the subject is metaphysical or transcending nature; physico-logical when the subject is a natural object, or embraces natural objects.* Thus of the two definitions used as examples above, the former is purely logical, the other physico-logical.† It is true that a naturalist might not be satisfied with the definition given of man; but this would be, only because it employs not the mode of limitation which his system requires. He might find it necessary, for his end, to define man, *a mammal having two hands with thumbs opposable to the fingers, and three kinds of teeth, cutting, canine, and grinding.*‡ But the other definition, though formed with a different purpose as regards the future deductive process, is a physico-logical definition as well as the latter. In the latter, the characteristics forming the specific difference, namely *having two hands*, &c., have reference to a different artificial genus, namely *mammal.* Thus various for the different purposes of development, are physico-logical definitions: and if so, it will be readily conceived that those

* We say *subject* when we refer to what exists only in the understanding, namely, the knowledge of what an outward thing is, distinct from the outward thing so understood:—we say *object* when we refer to this outward thing. Hence the distinction into Subjective and Objective, which will occur in some future statements.

† It must be borne in mind that physical things, in our view, include both real and ideal things, and hence the definition of an ideal thing,—for instance, of a phœnix as *a bird fabled so and so*,—is a physico-logical definition.

‡ Genus and difference, if not capable of being respectively signified by a mere grammatical substantive, and mere grammatical adjective, will nevertheless still be so signified by constructed expressions equivalent to those two parts of speech; that is to say, by what, in "Principles of Grammar," are called a logical substantive and a logical adjective. Here, *a-mammal*, is the logical substantive,—what remains of the definition, the logical adjective.

purely logical must be still more subject to the choice or arbitrary determination of the thinker. In forming these, he is under no more than a prudential restraint; as, for instance, the custom of language, which ought to prevent him from defining a word quite apart from its usual meaning. One thing he has always to remember, that whatever limitation he chooses to give to the meaning of a word, to that he should strictly adhere in his subsequent development. Suppose, for instance, that he has defined Pride to be *inordinate self-esteem*,—he could not, under such a definition, justly propose, in any branch of his development, to treat of a proper or decent pride; for the very purpose is contradictory. To accomplish the purpose, his original, or some secondary definition, must assign a less limited meaning to the subject, as, for instance, by calling it self-esteem, simply; and then treating of it under the heads of an improper and a proper self-esteem.

First Note to Chapter III.

It may assist the student to the better understanding and application of what precedes, to quote, however we may have anticipated them, the following rules and cautions from Dr. Whately's Logic: "First, the definition must be *adequate;* that is, neither too extensive nor too narrow for the thing defined: for example, to define fish *an animal that lives in the water*, would be too extensive, because many insects and other creatures live in the water:—to define it *an animal that has an air-bladder*, would be too narrow, because many fish are without any. Or again, if in a definition of money, you should specify its being *made of metal*, that would be too narrow, as excluding the shells used as money in some parts of Africa: if again you should define it as *an article of value given in exchange for something else*, that would be too wide, as it would include things exchanged by barter. And observe, that such a defect in a definition cannot be remedied by making an arbitrary exception: if, for instance, a person were to give such a definition of *capital* as should include *land*, without meaning to have included it, and should then propose to remedy the fault by saying, that capital is *any property of such and such a description* EXCEPT LAND. Secondly, the definition must be in itself plainer than the thing defined, else it would not explain it:—in *itself* plainer, that is, generally; because, to some particular person, the term defined may happen to be even more familiar and better understood, than the language of the definition. And thirdly, (though this rule may be considered as included in the rule just given,) the definition should be couched in a convenient number of appropriate words. Figurative words are opposed to appropriate, and are apt to produce ambiguity or indistinctness: too great brevity may occasion obscurity; and too great prolixity, confusion."—"Tautology, which is a distinct fault from prolixity or verbosity, must also be avoided, that is, tautology which consists in in-

serting too much, not in mere words, but in sense; not so as too much to narrow the definition (in opposition to Rule first,) by excluding some things which belong to the class of the thing defined, but only so as to state something which has been already implied. Thus, to define a parallelogram, *a four-sided figure whose opposite sides are parallel* AND EQUAL, would be tautological; because, though it is true that such a figure, and such alone, is a parallelogram, the equality of the sides is implied in their being parallel, and may be proved from it. Now the insertion of the words *and equal*, leaves, and indeed leads, a reader to suppose that there may be a four-sided figure whose opposite sides are parallel, but *not* equal. Though therefore such a definition asserts nothing false, it leads to a supposition of what is false; and consequently is to be regarded as an incorrect definition." The effect may be further illustrated by the following examples. "If it be laid down that he who breaks into an *empty* house shall receive a certain punishment, it may be inferred that this punishment will not be incurred by breaking into an *inhabited* house:—if it be called a crime for people to violate the property of a *humane* landlord who *lives among them*, it may perhaps be inferred that it is no crime to violate the property of a landlord who is *not* humane, or is an absentee."

Second Note to Chapter III.

Connected with the laws of definition, and indeed involved in them, is the fixing of preliminary conditions, at least in the mind, before we enter on a dispute or discussion. It should be settled, for instance, what is the ground of dispute:—is it a real or verbal question, that is, a question concerning facts, or a question concerning the application of a word? A dispute otherwise interminable, may often be cut short if not adjusted, by the application of this test. Two persons are disputing whether A. B. was a man of genius:—"Are you," it may be said by one of them, "are you agreed with me that he was capable of such and such productions; if so, it is a question about the application of a word, and now let us see in what way custom authorizes the use of the word, and what sense agrees with our present meaning." Or suppose the parties use the word in exactly the same sense; then the dispute turns on facts or the character of the facts; to ascertain which, recourse must be had to inquiry, comparison, and general estimation. Further; the logician should be aware that on many questions which are given out for the express purpose of provoking discussion, a sensible person would express no opinion unless he were permitted to qualify it. Thus, for instance, the often mooted question: *Is a public or private education preferable?* This, as a general question, cannot be rationally answered:—we ought to know exactly what the education is, which, under each denomination, is proposed to be given, as well as the disposition of the person who is to be subjected to it, and his ulterior prospects in life. Thus limited, the question would present itself in a very different shape, and probably leave room for little or no difference of opinion.—*In the wars which closed with the Pacification of Paris in* 1815, *was Great Britain more indebted to her army or her navy?* Such a question in an assembly composed of the two different interests, would probably have produced, some few years ago, a very animated discussion; but it is one which, instead of discussing, it would be wise to

object to altogether, on the ground of its being impossible to be proved; that the operations of each service for which credit would be assumed, did not arise out of, and take their character from, the existence of the rival service:—the question is nearly like such a one as this,—*Is the heart or the head more useful to the rest of the body?* We might indeed reasonably ask, *whether Great Britain should seek to be a great naval, or a great military power?* Such a question would permit a decision on rational grounds; but in proportion as we become rational, we leave less room for contention, and the other question would probably be preferred by those who propose subjects expressly to provoke discussion.—*Is the decline of nations more owing to the misconduct of governments, or the degeneracy of the people?* Here two *separate* causes are assumed, before it has been established that they act separately. We might as well ask, *whether the decline of the bucket into the well is more owing to the rope or the wheel?* It would indeed be reasonable to inquire, *whether wrong principles and practice in government do not produce degeneracy in the people?*—and, *whether degeneracy in the people, does not leave little chance of a good government to reclaim them?* The determination of these inquiries, which would be attended with little or no difference of opinion, would show that there is no rational ground for the alternative proposed in the previous question.—*Is a convulsive revolution, such as we have of late so often witnessed on the continent, mischievous or beneficial to a nation?* A sensible reasoner would affirm neither side of the question, unless permitted to qualify, and then he would affirm both: it is mischievous at the time; it is likely to be beneficial in some uncertain number of years to come. We thus walk aside from the snare, for which, it may be, the question was put. Had the answer affirmed such a revolution to be beneficial, it would have opened the means of rhetorical delusion specified in the last Chapter, (Section 33.) As it is, the answers are quite innocent; the one affirms an experimented fact; the other permits no practical inference; since, though it is true that a man may get a new and a better house by being burned out of an old one, we cannot rationally act upon this fact, and set a house on fire to the imminent danger of the inmates and the neighbourhood whenever a new one is wanted.

CHAPTER IV.

DEDUCTIVE LOGIC.

1. Deductive logic is the art of developing in words, and making special, *for one's own conviction and satisfaction*, the knowledge obtained by the inductive process. It differs from Rhetoric by stopping short at the object stated. Nevertheless, as Logic ought to be exercised so as to prepare for Rhetoric, every development of deductive logic must be considered imperfect, unless, while it convinces and satisfies oneself, it is also fitted to convince and satisfy all, who have the same previous knowledge.

Theory of Deductive Logic.

2. We have seen that, in the inductive process, every act of the understanding includes three things, the thing known, the thing by which it is known, and the knowledge gained. Being gained, the knowledge remains abstract from the things, not indeed ever present to consciousness, but revivable upon occasions that require it, by the presence of real or of ideal things, or by means of a sign audible or visible. But when the knowledge is revived by its proper occasion, it does not always bring with it all the things which suggested it; and we have to develop these things by that conscious effort which we call *thinking*. This is, in other words, to go back to the steps (not exactly, which would scarcely be possible, but virtually, to the steps) which led to our knowledge: and such development is the practice of deductive logic; which development never includes, in strict theory, more than we *already* know. Thus, for instance, we may meet with some instance of kingly magnificence which awes our thoughts, so that we understand, for a moment, such condition of man as something different from the ordinary lot of humanity; but considering afterwards, as a part of our knowledge *already* acquired, that a king is but a man, we shall conclude that kings are not exempted from the lot of other men, but, like them, are mortal. The development of such knowledge may be expressed in words by a single proposition, namely, "Kings, who are but men, are mortal." Or it may be expressed in three propositions, which represent the three things that originally constituted our knowledge: namely, 1. "Every man is mortal: 2. Every king is a man: 3. Therefore, every king is mortal." When we develop our knowledge in this manner, the three propositions are a syllogism. When we develop it in any other way which forces assent from a person possessed of the pre-supposed knowledge, the syllogism is virtually included in the expression; because the three things which the syllogism represents, are included in every act of the understanding. Hence, the syllogism is properly resorted to in all cases of doubt or difficulty, for the purpose of testing the knowledge gained, with relation to the conclusion which it necessarily includes.

Note to Section 2.

Our Syllogism is the *informal* Syllogism, by which is meant the Syllogism that makes no use of the doctrine of comparison between extremes and middle terms, which belong only to the doctrine of the formal syllogism of Aristotle. The syllogism given as our example above, happens to exhibit those terms in the construction of the several propositions; but this is accidental to our syllogism, and not essential or important. In our doctrine, each premise of the syllogism is one expression with one meaning; and, in the instance above, is the statement, in each, of a known truth or fact. But these facts are no sooner stated in connection, than they inevitably suggest the conclusion which is expressed by the third; and the whole of them are now one expression with one meaning. To ask why they are so, or to take in hand a demonstration of what is thus attained, is a question, and a proceeding, as absurd as it would be to ask why a rose is fragrant, and to set about a verbal demonstration that it is so. Accordingly, with men of sense and education, but not so educated as to be trammelled by scholastic logic, the syllogism in actual use, is the informal syllogism; and to this they have recourse, when, in the inductive process, not being quite satisfied with the grounds on which they have come to some *inference*, they *deduce* the process in a syllogism, that so the grounds and the conclusion (inevitable in the deduction) may be clearly set forth, and the defect, if any, may be seen; which fault will always be found in the premises, and never in the conclusion.

But say the Aristotelians,—that is, they who *are* trammelled by scholastic logic,—we find in the practice of reducing all syllogisms to the demonstration of extremes and middle term, a wonderful power in sharpening the intellect. It may be so: riddles, charades, and conundrums have this power also. But is it an exercise which sharpens the intellect for the high practical purposes of life? May not a person acquire great skill in the reduction of reasoning to the Aristotelian formulas, without any benefit, nay even with prejudice, to the natural powers of the understanding exerted for the ends just alluded to? He who makes use of a complicated instrument to effect that which nature has fitted him to do with his naked hand, may possibly fail in using the instrument, though he could not fail in using the natural means. We reserve our proofs of what is here suggested only as possible, to another opportunity. If we shall be able to show that Dr. Whately himself is guilty of a gross fallacy, that of the circle, in endeavouring to establish the claims of the Aristotelian syllogism, the cause of the error must be set down, in him, not to the want of great natural judgement, which Dr. Whately, of all men, cannot be accused of, but to some defect in the employment of his *instrumental* means of coming at his conclusion. (See the next Chapter, Section 9.)

There is an enormous delusion in the doctrine of the Aristotelian syllogism, which may be taken notice of before concluding this note. In this doctrine it is pretended that the reasoning process can be exhibited distinct from the subject-matter of reasoning. What we affirm, (and the affirmation, we presume, carries conviction along with it,) is, that where there is no subject-matter to be understood, there can be nothing under-

stood. When we say—Y is X, but Z is Y—we affirm what is not true, and there is no conclusion: but if proviso is made that Y shall be the same as X, and Z the same as Y, a conclusion follows; and the cause is, that, by the proviso, X, Y, and Z, become real subject-matter.

3. But though, in strict theory, the development of knowledge never can include more than we already know; we cannot, in practice, always distinguish between the inductive and the deductive process. For in *thinking*, that is, in the effort to develop our knowledge, it is the proper course, when we do not find in our previous experience or accredited information, sufficient ground for what we presume we know, to go back to the inductive process, in order to collect the proofs or disproofs of such presumed knowledge. Such proofs are called *External arguments;* and in the practice of deductive logic, they very often occur among the *Internal arguments;* which in strict theory are alone proper to Deductive Logic. Hence the principle of deductive logic, as it is to be practically conducted, may be laid down as follows: It is, to develop our knowledge, by following it into that which is necessarily included in it, but which we do not at once recognize as so included, either from defect of attention, or *because our knowledge is assumed before we have legitimately reached it.*

4. Every single word is, as we have seen, the sign of abstract knowledge, and, if legitimately used, includes all the steps by which the knowledge has been gained, and every step was an act of the understanding, which, as already stated, always implies the co-existence of three things. Now when the knowledge, which we have abstracted to the utmost degree that our faculties can reach, or the words we use can signify, is to be deduced and specially applied, the universal method of logic is this: to join words together which have a separate or abstract meaning, so that each loses its abstract meaning, by each helping the other to suggest a more special meaning, the expression formed by the junction of the words, becoming—the instant they are joined—only one expression for the one more special meaning. This is what we called, joining words together to make sense; and it is presupposed that while they make sense, they shall also make grammar, that is, be accurate forms of construction. Thus, for instance, *red* and *earth*, are respectively signs of abstract knowledge: so likewise are *Time* and *flies:* so like-

wise are *every* and *man:* so likewise are *is* and *mortal.* But *red earth* being joined make sense, and are one expression for one meaning, which meaning is special in comparison with the separate meaning of *red* and the separate meaning of *earth.* The same is to be said of *Time flies* and of *Every man* and of *Is mortal*, when the respective words are joined. And again, with regard to the last two expressions, each of which is now to be esteemed only one logical element or part of speech, the moment we join them together, we find they make sense, and that sense is special in comparison with the separate meaning of *Every man* and the separate meaning of *is mortal.**

5. The grammatical function of a sign, whether single, or compounded of several that form one expression with one meaning, does not affect the previous statement. It is true that a sign whose form indicates that it is only a *part* of speech, carries, in that form, a warning that we are not to rest in its separate meaning, but to await the junction of another sign for some more special meaning intended. But a sentence completely constructed, though it does not carry the same warning in its form, is nevertheless,—if not the final sentence, but one of a link in the chain of expression by which the thought will at last be developed,—as much a part of speech as any individual word recognized by grammar as a part. The complete logical expression or WORD, is nothing less than the whole of the means used to develop the knowledge which the thinker chooses to unfold at the time; and it may amount to a large discourse, which being completed, is one expression for the knowledge unfolded; of which the

* So, *man*, *horse*, *cards*, *a*, *horseback*, *on*, *of*, are each a single grammatical word, each implying abstract knowledge. Again, *a-man*, *a-horse*, *on-horseback*, *of-cards*, are, respectively, signs of meaning less abstract, that is, of knowledge in a degree more specially developed, the signs being formed of mere grammatical words joined by grammar and by logic. And again, *a-man-on-horseback*, *a-pack-of-cards*, are signs, similarly formed, of meaning still less abstract. The examples, a little improved on those in Aldrich, are given in Whately's Logic (Book II., Ch. 1, § 1) as instances of Simple Apprehension, Incomplex and Complex; distinctions founded, like the Aristotelian doctrine generally, on essentially wrong notions of the way in which language is the exponent of thought. Dr. Whately, as if suspicious of the fact, expresses himself with some caution in his later editions, as compared with the earlier.

several portions are properly deemed parts of speech in Logic, though devoid of forms to imply that they are parts in grammar.

6. But though a sentence may be, in Logic, and commonly is, only a part of speech, yet the difference adverted to, namely, that it does not carry in its form a warning to wait for meaning to come, enables us to rest in its meaning, if we please, although the rest may be temporary. A sentence may therefore be described as an expression that *proposes* or lays before the thinker the development of his knowledge: as "Time flies:" "Every man is mortal:" "A king is but a man." It is therefore called a *proposition*. A grammatical part of speech only begins, or continues, or completes such a proposition, and by its form indicates that it is to be understood as doing no more: for instance, Time—; Man—; Is—; Every man—; Time as it flies—; A king, who is but a man—. These, by their form, are evidently only parts of propositions; that is they are grammatical parts of speech. Among these we may distinguish from the *mere* grammatical parts, such as (though grammatical also) exhibit a development to a certain extent, though not a development in which we rest. Such compounded parts of speech we have been taught, in grammar, ("Grammar on its true basis,") to call *logical* parts of speech.

Distinctions and Directions to assist in the Practice of Deductive Logic; based on the foregoing theory.

7. When we intend to develop our knowledge, we have first to choose the form of expression by which the knowledge to be developed shall be signified. The expression may be a single grammatical noun, or a logical noun, or a proposition. Thus, *Socrates; Man; Pride; Knowledge;* are single grammatical nouns;—*The death of Socrates; The reason of man compared with the instinct of brutes; Pride of birth; Knowledge of the world,* are logical nouns:—*Knowledge is power; Virtue is its own reward; It is Education that forms the mind;* are propositions. Of these, the subjects expressed by single words are the widest, including an indefinite number of subordinate subjects to be expressed by logical nouns, or by propositions. The subjects expressed by logical nouns, or by propositions, are more limited; but are still resolvable into subordinate subjects to be expressed in the same way.

8. When the subject to be developed is expressed by a single word, the first proof that can be given, logically, of the existence of the knowledge presumed to be included under it, (though the proof may not always be required,) is its expansion in what is called a *Definition.* All knowledge consists in being aware of the relations in which the thing known stands to oneself and to other things. Suppose then, a subject to be expressed by a single word, it is almost always possible, as we have seen in the previous chapter, to class the subject with other things; which are therefore said to be of the same *genus* or kind; and then to distinguish it from these things by stating its *difference. Genus* and *difference*, as we there saw, form a definition. Each of these may sometimes be expressed by a single word, as in defining Socrates to be a *Greek philosopher*, Man to be a *rational animal*, Pride to be *inordinate self-esteem.* But it may not be possible, and if possible, it may not be sufficient for our object, to begin thus briefly the development we propose; or if we so begin, we may add much more, so that an essential definition becomes an accidental one, or description. Thus, we may carry out our definition of Socrates into all the particulars of his life, till the *difference* between Socrates and others of his *kind*, amounts to a biography of Socrates. Suppose for another instance, that we have to define so common a thing as a chair or a table, it must be done by genus and difference,—by stating what *kind* of thing it is, and how it *differs* from other things of its kind. Thus both chair and table may be called *an article of furniture;* that is their genus: of a chair, the difference is, *so far raised from the ground, and so adapted, as to receive a person in a sitting posture:* of a table, the difference is, *so far raised, &c., and so adapted, by having a flat surface, as to hold readily for the hand whatever may be placed upon it.* Again; suppose we have to define such a subject as Generosity:—we must first seek for a *generic* term, such as sentiment, and then add words to *specialize* the term; as, "Generosity is *the sentiment which takes pleasure in conferring benefits.*" There are wider meanings of the word than this; but this may be all the meaning which the further development is intended to carry out.

9. If the subject to be developed is expressed by several words, as, for instance, *A knowledge of the world*, the general

term knowledge is evidently limited, being in fact thus far developed. Still, as with a subject expressed by a single word, there will remain an indefinite number of points or purposes of development, at the choice of the thinker. But if the subject is given in the shape of a proposition, as, *A proper knowledge of the world is favourable to virtue*, there is then only this one proposition to be established,—in other words, only one purpose of development. Now the means of development are what are called *arguments;* and we have next to inquire what is an argument.

10. An Argument, often called a Reason, is a proposition whose truth being admitted, the truth of the proposition which it is used to establish must also be admitted; as "Kings are mortal, for *they are but men*:" "John lived in London; for *he lived with his uncle*." We say that the truth of the proposition in italic being in each instance admitted, requires us to admit the proposition which precedes, to be true:—but requires whom?—certainly not every one; it requires the admission only from those who, in each instance, have certain further knowledge; namely, as regards the first instance, this further knowledge that *men are mortal;* and as regards the second instance, this further knowledge, that *John's uncle lived in London*. The further knowledge supposed in the first instance is knowledge that every body is presumed to have, and the argument will as widely be received as valid; but the further knowledge supposed in the second instance may be in possession only of a few; only to which few can it be offered as an argument; but for them, it is quite as valid as the argument in the other instance. We see, then, that in the development of knowledge as in the induction, there are three things present at every step or stage of progress, and these three things in the deductive procedure, may be named the *datum*,—commonly unexpressed, but always present in thought,—the *argument*, and the *conclusion*. When these are all expressed in the order here mentioned, they form the syllogism of deductive logic; as, "Men are mortal; Kings are men; therefore, Kings are mortal;" "John's uncle lived in London; John lived with his uncle; therefore, John lived in London."

11. Arguments have technical names derived from three

sources. i. From the *Topics* whence they are taken. ii. From the *Data* to which they are addressed. iii. From the *Forms* of development. Our practical distinctions must be continued by a statement in detail of the divisions and subdivisions under each of these heads.

Practical Distinctions continued: (i.) Names of Arguments from the Topics whence they are taken.*

1. *External Arguments—Experiment and Testimony.*

12. If the argument or proof which we seek under a general head or topic, is not already a part of our knowledge, such general head or topic will be either Experiment or Testimony; and the argument will be derived externally. It will not, in this case belong to *deductive* logic, but *inductive*: that is to say, it will be knowledge yet to be sought and made our own, either by actual experience, or by admitting the experience of others in place of actual experience. Now all our knowledge is originally suggested by external things, and therefore differs not, in its beginning, from that belonging to the topics here proposed under the two names *Experiment* and *Testimony*. But the reason for the distinction is this; the arguments sought after under the heads called *internal*, are presumed to be included in the subjects which we undertake to develop; because to understand the term designating the subject, is to have the knowledge which that understanding necessarily includes. Thus, for instance, to understand what is meant by a plant, a mineral, an animal, is to know what is a plant, what is a mineral, what is an animal: to understand what is meant by pride, or by virtue, is to know what constitutes pride, what constitutes virtue. But the knowledge here supposed is ordinary knowledge; not the recondite relations which the scientific experimentalist reaches; relations which, as to a plant, a mineral, an animal, form the physical sciences, Botany, Geology, Zoology; any treatise or development of which, must be founded on proofs called experimental. Thus, again, if knowledge is proposed to be

* The *Data* and *Topics* of arguments are quite as necessary to be considered in Rhetoric, as in Deductive Logic; and they are accordingly exhibited, with appropriate differences of view, in the Manual of Rhetoric.

developed from the proper names *John* or *Socrates*, all we can presume the names to include, is, that there is, or was, a man called John or Socrates:* if more than this is developed, or sought to be developed, it must be, from the peculiar knowledge which the thinker enjoys, the fruit of his peculiar experience, or of the information he derives, as a learned man, from the stores of history. The scientific knowledge thus induced under the term, is not *necessarily* included in it till the induction takes place; and even then, the arguments are fitted to convince only those who have the knowledge, and not the generality of persons, who use and understand the terms no further than in their ordinary sense. Deductive logic is, however, the art of developing in words such knowledge as we have; and therefore if the thinker has the knowledge here assigned to the two heads called external, the knowledge is, to him, internal, and the distinction a name without a difference; though, as a name, it will be useful, when we have to employ logic as a basis for rhetoric.

* Hence Mr. John S. Mill denominates a proper name a *non-connotative* word. Connotative, according to him, is that which notes something, and, along with it, something more, or, in addition. Thus the word *man* is connotative; for while it notes any one man, it notes his kind, or all that constitutes him a man. Thus again the word *white* is connotative; for while it notes the quality, white, in any one thing, it notes or implies it in all other white things. On the other hand, *John* and *whiteness* are said to be non-connotative; and we may perhaps exemplify the reason given for this by saying, that they are words incapable of being used in predication otherwise than specially: we cannot say, for instance, "This man is John" by virtue of any general knowledge included in the word, but only by virtue of our special accidental knowledge that such is his name: neither can we say of anything, except of whiteness itself, that "It is whiteness;" for the word whiteness is so grammatically conditioned as to be *immediately* applicable only to our knowledge of what whiteness is, and *not immediately* to the white things from which that knowledge has been derived.—In thus explaining the distinction sought to be enforced by the term non-connotative, we wish it to be seen that it arises entirely out of the Aristotelian doctrine of predication: and its utility or inutility must be estimated by the utility or inutility of that doctrine. Whether, with just views of the relation which language bears to thought, *John* and *whiteness* are not connotative, as well as *man* and *white*, we leave *our* student to inquire.

2. *Internal Arguments—Definition, Etymology, Enumeration, (not Induction,) Genus and Species, Cause, namely, Efficient or A-priori, and Final or A-priori, Effect or A-posteriori; Antecedents, Consequents, Adjuncts;* Comparison, *namely, Similitude, Analogy or Parity of case, Contraries, Proportion, and A-fortiori.*

13. When, having laid down some point or purpose of development, we go on to argue the truth of what we assert by appealing to the nature of our subject, as it is, or as it might be exhibited in a definition, we are said to reason from DEFINITION. If, for instance, we desire to develop the knowledge contained in the proposition, Man is accountable for his actions,—the argument may be, that he is a creature endowed with reason and liberty; which is a definition of man's nature. This is an argument by virtue of the datum, that every creature endowed with reason and liberty is accountable for his actions; and both being admitted as a part of our previous knowledge, the conclusion is inevitable. Or if we desire to place the truth evidently before us in words, that certain lines are equal to one another, the argument may be, that they are radii of the same circle. This is an argument by virtue of the datum, that the radii of the same circle are always equal; and both being admitted as belonging to our previous knowledge, the conclusion is again inevitable.

14. When we develop our knowledge from the original sense of the word that stands for our knowledge, we are said to reason from ETYMOLOGY. If, for instance, we desire to develop the knowledge, That the idle have no relaxation,—the argument may be, that the word relaxation originally signifies, the loosening of what is tight. Borrowing from another topic hereafter mentioned, namely, Analogy or Parity of case, we add to the argument from Etymology, the further argument, That as the idle never apply, or draw their faculties *tight*, so they can never be said to relax their faculties. The former is an argument by virtue of the datum, that the idle do not loosen what is Tight; and the latter an argument by virtue of the datum, that Not to draw the faculties tight and not to apply them, are expressions that mean the same thing. All this being admitted as a part of previous knowledge, the conclusion is inevitable.

15. When we develop the knowledge we entertain under a general term, or a general proposition, by detailing the particulars which constitute our knowledge, we are said to reason from ENUMERATION. Thus, for instance, we develop our knowledge of what a dozen means, or a score, by counting up to a dozen, or a score inclusively. This is an argument by virtue of the datum that the number so counted is a dozen, or a score; and the conclusion follows inevitably. Thus, again, if we wish to develop the knowledge contained in the proposition, A fine art always addresses, as its appropriate object, our imaginative sensibility, through the sense of hearing or of sight; our first argument may be an enumeration of the fine arts, namely, Poetry, Music, Painting, Sculpture, accompanied, in each instance, by the more special proposition that Poetry addresses, as its appropriate object, our imaginative sensibility, through the sense of hearing; Music addresses, &c., through the sense of hearing; Painting addresses, &c., through the sense of sight; Sculpture addresses, &c., through the sense of sight. This enumeration is an argument by virtue of the datum, that Poetry, Music, Painting, Sculpture are all the fine arts; and both being admitted as a part of our previous knowledge, the conclusion is inevitable. Thus, again, if we wish to develop our knowledge, that a heavy body lifted from the earth, has always fallen to the earth again when the sustaining power was removed, our argument may be, the enumeration of A, B, C, D, &c., which in our own experience or that of others, has, in each instance, fallen to the earth under the circumstances stated. This again, is an argument by virtue of the datum, that A, B, C, D, &c., are all the things, or represent all the things, on which the experiment has been tried; and both being admitted as a part of our previous knowledge, again the conclusion is inevitable.

The argument from Enumeration is sometimes confounded with the argument from *Induction;* but Induction as we have seen, is not an internal argument; and the conclusion it suggests is not included in the premises, and therefore is not a *necessary* conclusion but an inference, although we do not the less receive it as true. Thus, for instance, having to ascertain whether it is a truth or general law, that every heavy body being lifted from the earth, will fall again to it if every

intervening thing be removed, we have recourse to experiment; and the experiment answering our expectation, we then infer that as A, B, C, D, &c., *have fallen* again to the earth after having been lifted from it, so all bodies whatever *will fall* to earth under the same circumstances, in other words, that this is a general property of bodies near the earth's surface. Now, the inference here is not included in the premises; the necessary conclusion from which, is, that A *has* fallen, that B *has* fallen, &c., not that Z, Y, X, &c., *will* fall. And this sort of conclusion is called the Inference of Physics.

Yet the difference between the argument from Enumeration and Induction is done away with, by conceding the knowledge, a knowledge which all people must acquire,*— that

* But why must they acquire it? The philosophers of the Scottish school here come in with what they call a fundamental principle of belief. I am glad to avail myself of the objections to that dogma, which one of their number, Mr. James Douglas of Cavers, thus urges: "That Reid, Stewart, and Turgot, have been mistaken, in proposing such an *original* law of thought, as a belief in the continuance of the laws of nature, will easily appear. That can never be an original proposition which consists of slowly acquired terms. Had we an innate idea of nature, of laws, or of permanence, then we might have such an ultimate and instinctive principle: but since the notion of nature is very gradually acquired, and since the term laws is metaphorical, the absurdity of our forming a conclusion while we are yet unfurnished with the premises, will be abundantly apparent. Should it be said that this law of thought remains dormant till we become acquainted with the meaning of nature and of laws, though this supposition is sufficiently absurd in itself, it may be further observed, that our belief of this permanence of the laws of nature, is certain and uniform: but no certain conclusion can be attached to variable terms, such as the very complex and fluctuating notions of nature and her laws. Unless we had within us a model of what nature is, and what her laws are, and also whether continuance is to be understood in an absolute, or in a qualified sense, it would be impossible to arrive with any certainty at the conclusion, which is thus made the foundation of our belief, and of reasoning. The truth is, here is a confusion between acquiescence and belief. To acquiesce in the regularity of nature, is one of our earliest habits, but to believe in the permanence of the laws of nature, is one of the ripest acts of the understanding. The process from childhood does not seem to be well understood—the child receives all things, according to the philosophic expression of Wordsworth, in "a wise passiveness." It has no doubts, and therefore can have no belief. The permanence of the laws of nature mould the thoughts of the child to their own continual recurrence: what is still more, the structure of his own frame corresponds and fits in with the laws of external nature. Not only are all his thoughts moulded, for example, to the succession of day and night, but the structure both of his

where an experiment never has failed, it never will fail. The *datum* will then be, As A, B, C, D, &c., have fallen to the earth after being lifted from it, so Z, Y, X, &c., will fall under the same circumstance: the argument will be as before that A, B, C, D, &c., have fallen: from which argument the conclusion by virtue of the datum, That Z, Y, X, &c., *will* fall; now follows, as necessary and inevitable, because the premises now include it.

16. When we develop our knowledge by going back to knowledge that includes it, instead of using an argument that comes immediately under the knowledge we purpose to develop, we are said to reason from the GENUS. Thus if, in order to develop our knowledge, that man will be punished or rewarded, for which our special argument might be, that he is accountable for his actions; we choose to use the more general argument, Every creature endowed with reason and liberty is accountable for his actions; we shall properly be said to reason from the *genus:* since, *every creature* endowed with reason and liberty, includes the *species*, man. So again, if we wish to develop our knowledge, that a devotion to poetry quickens the imaginative sensibility, we may take our argument from the general definition of the fine arts instead of the definition of poetry in particular, and the argument will then be from the genus instead of the species, although it will also be taken from the definition or nature of the fine arts.

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body and mind fit him for the alternate change of light and darkness, of activity and repose. The moment that any doubt should occur to him,—which can only be after his reason is exercised, and his thoughts have taken a free range,—that moment they would be repelled by a principle already familiar to him, not indeed in words, but implied in our earliest reasonings, the principle to which Leibnitz has given the name of sufficient reason. This is not an original principle itself, but is merely the logical form of that original principle which we have already pointed out, that every change refers to a cause. Where no adequate cause has operated, no change can have taken place. The course of nature must continue, till the power which gave it that course changes its direction. There can therefore be no reasonable doubt as to the permanence of the laws of nature, except in those cases where the interposition of God can be reasonably expected. Thus, then, we need not multiply original principles without necessity, but may rest our belief in the continuance of the laws of nature upon that fundamental belief that every event has a cause."—*The Philosophy of the Mind: by James Douglas, Esq., of Cavers.* 1839. page 226, *et seq.*

An argument from the SPECIES would of course be from the definition of poetry in particular; but such argument would be more eligibly assigned to the topic definition, leaving to the topic *species* only what is otherwise called *example* or *instance*. Thus, if we sought to develop our knowledge that Industry is the source of all the blessings of life, we might give as an instance of one of these blessings, the improvement of the mind by study; which is an argument by virtue of the implied datum, that this is but one of similar instances, which instances, if completed, would form the argument called *Enumeration;* and that this instance may be rationally accepted in place of all.

17. When we develop our knowledge, by so much of the nature or *definition* of the thing known, as accounts for certain effects, we are said to reason from the CAUSE. Thus, in order to develop our knowledge that Pride is odious, we may use for our argument, the proposition, that it offends the self-love of others. This is an argument by virtue of the datum, that every thing which offends the self-love of others, is odious. Again; if we wish to develop our knowledge, that wine largely and frequently drunk, is a poison, we may use for our argument, that it tends to destroy the constitution; which is an argument by virtue of the datum that every thing which tends to destroy the constitution is a poison.—But note, that in *deductive* logic, nothing can be called a cause which is not already admitted to be one. The discovery of natural causes is the business of the physical sciences, and the conclusion belonging to them is *Inference;* a conclusion which is never included in the premises, and is therefore never a *necessary* conclusion: it is always a conclusion which may be set aside by subsequent experiment. Thus, for instance, we may conclude from the fact, that a man has died after having eaten of a certain herb, that it is a poison: this is an inference. But if, subsequently, we find that thousands of people have eaten of the same herb with no ill effect, we are obliged to renounce that inference, and infer that the herb is not a poison. In neither case, is the inference a conclusion belonging to deductive logic, but an inference of physics, and assignable to inductive learning.—The examples given above are examples of what is called *Efficient* cause. From this we have to distinguish what is called *Final* cause. A final cause

is, in other words, the motive, end, or purpose, on account of which something has existence: thus when a man dies by *poison*, and by his *own act*, these are the efficient causes of his death: the final cause, may be to escape from the tortures of the rack, or the agonies of insanity, or despair.

18. When we develop our knowledge by so much of the nature or *definition* of the thing known, as may make its nature evident in what it produces, we are said to reason from the EFFECT or effects. Thus, in order to develop our knowledge that Pride is odious, we may use for our argument the proposition, that all persons shun the society of the proud. This is an argument by virtue of the datum that a quality must be odious which makes all persons shun any one who has it. Thus, again, we may develop our knowledge of a diseased constitution in a person who drinks wine largely and frequently, by affirming that the disease is the effect of such practice; which is an argument by virtue of the datum that the disease uniformly follows the practice, and that whenever there is this uniformity of sequence, that which precedes is the cause, and that which follows is the effect. But note, that in *deductive* logic, nothing can be called an effect which is not already admitted to be an effect with reference to a correlative cause. The discovery of natural effects is the business of the physical sciences, and the conclusion belonging to them is inference. If, for instance, in any particular case, there is room to suspect that disease in a man who drinks largely and frequently of wine, is not the effect of that practice, the suspicion must be admitted so far as to warrant the search after the proper correlative cause; but the certainty or uncertainty of the inference resulting from such search, has nothing to do with the certainty of the deductive conclusion; for this being contained in its premises, is always a *necessary* conclusion. Yet it is to be remembered that the premises will be faulty, if they state as a certainty what the inductive inference only makes probable.

19. The phrases A-PRIORI, and, A-POSTERIORI, often occur as terms belonging to logic; implying the same things as argument from Cause, and argument from Effect: but their use instead of these terms requires explanation. Among the ancients, there prevailed an opinion that all knowledge flowed from certain original truths implanted in the mind,

and that every special truth was but a deduction from these original truths. But if, as modern philosophy teaches, all the knowledge we can reach, is the result of experience, while we admit that the faculties of our race are such as to be affected by the same experience in the same way, it follows, notwithstanding this admission, that, taking the expression absolutely, there is no such thing as *a-priori* knowledge. But taking the expression relatively, that is, assuming certain knowledge to be inevitable where there is the capacity for it, and also the ordinary occasions of suggestion or of learning, then all reasoning which is deductive will be *a-priori* reasoning, and all inductive reasoning will be *a-posteriori* or from facts, that is from new facts. We may hence define *a-priori* reasoning to be that which proceeds from truths already known, and merely deduces the special truths included in them; while *a-posteriori* reasoning is that which infers general truths from particular truths, which particular truths do *not necessarily* constitute them, but are admitted to be quite sufficient to establish them as science, from which we are entitled to reason deductively, that is, on the *a-priori* principle. Thus, we conclude *a-priori* or beforehand, that a man will die as the effect of having drunk a mortal poison without an antidote: thus, again, we conclude *a-priori*, that pride will render a person odious to all who are made to feel its effects; and thus, again, we conclude, *a-priori*, that lines which we propose to make radii of the same circle will be equal to one another. But in every instance, (and it is the same in all instances,) the *a-priori* knowledge has been obtained *a-posteriori*: thus, we know that the man will die because previous effects had led us to infer the drug as a cause; thus we know that pride will make a person odious, because we have inferred that sentiment as the cause, in a variety of observed effects; and thus we know that lines which are radii of the same circle, are equal to one another, because experience has made us aware that in knowing what a circle is, the equality of its radii is included in our knowledge.*

* This point is in discussion. The old philosophers would have insisted that the knowledge of the properties of a circle, is original knowledge in man. Dr. Whewell, following the German transcendentalists, considers it to be an *explicated idea*, which indeed seems to come to the same thing. Dugald Stewart considers the definitions of geometry to be hypotheses. As to myself, I may seem, in an opinion I expressed many

20. The word *cause* means a permanent antecedent, or what we have found, by experience, to have a certain consequent, or certain consequents, and which we hence call an effect, or effects. But there are antecedents on which we cannot yet rely, so as to call them, with certainty, the *causes* of the consequents: and when we use such antecedents as arguments in order to infer the consequents, we are said to reason from the ANTECEDENTS. Thus, when a man has died after taking a certain drug which was not previously known to be poisonous, but which we now call so, we may be said to reason from the antecedent. This, however, is an inductive argument, and not deductive. In making it deductive, we assume a datum which logically necessitates its conclusion without diminishing the doubt accompanying the inference; as, When, after taking a drug, a person soon dies, it is *very probable* that the drug has killed him: This person took, &c., and soon after died: therefore it is *very probable* that his death was caused by the drug.

21. The word *effect* means a permanent consequent, or what we have found by experience always follow an antecedent. But there are consequents on which we cannot yet rely, so as to call them, with certainty, effects; and when we use such consequents as arguments in the development of our knowledge in order to infer the antecedents, we are said to reason from the CONSEQUENTS. Thus, when a man has died, and exhibits certain marks usual in people who have swallowed poison, we infer that he died through poison. But this is an inductive argument: the marks may proceed from other causes: and in transferring it to the deductive syllo-

years ago, almost to have anticipated Dr. Whewell's. In my Outline of Sematology (Beginnings of a New School, &c., First Essay, foot-note 150) I ask whether the definitions in geometry are not expressed "notions (knowledge) of and belonging to quantity, which, by the condition of the mind, we must reach, if setting aside the sensible instances of a line, a circle, &c., we try to conceive them perfect." This mode of explaining what I meant, I now perceive to be defective. How conceive them, an idealist will say, nature not certainly furnishing the patterns, unless the ideas were already in the mind? But I had no intention to describe them as ideas, that is conceptions. I meant and mean to say, that the definition of a line, &c., is nothing more than the statement of our knowledge what a straight line, &c., is; and how we get this knowledge independently of any idea of the thing, I have elsewhere shown: See Chap. II. Note to Section 10, page 112; "But, say the Idealists," &c.

gism, we must take care to assume, in the datum, no greater certainty of knowledge than we have reached in the inductive process.

22. When we develop our knowledge by entering on details which are not *necessarily*, or, as the ancient logicians consider, *essentially* included in the name of the thing known, we are said to reason from the ADJUNCTS or *Accidents* of our subject. Thus we may develop our knowledge of *John*, by all that constitutes the history of John. The name *John* itself is nothing more than the proper name of one of our species, and it does not necessarily or essentially include more knowledge than that John is a male of our species. All beyond this we may call the adjuncts or accidents of John. These adjuncts or accidents are nevertheless essential to the individuality of John when they have occurred; and all we can truly say of them, is, that they do not belong to the individuality of any other person.

Essence, in the doctrine of the ancient logicians, is that which makes a thing what it is. Thus *rationality* is the essence of man: and yet an idiot is not rational, though we still count him a man. An accident is that which belongs to some individual thing of the kind, but not to others.* If we are praising the pleasures of a country life generally, we may dwell on the sublimities of mountain scenery, or on the sweetness of shady groves: but every country has not mountains; and shady groves are pleasant only where the sun is scorching and oppressive. These, therefore, are adjuncts or accidents, and are non-essentials. Some accidents have been called *properties*: it is, for instance, the property of man to become gray: but this is a property belonging to man in old age, and not always even then. Again, it is a property of man to be capable of laughing. It may be doubted whether this is a property, or essential to the nature of man; but the discussion involves a point of no moment. Provided we understand the meaning of the words as they have been, and as they are still liable to be used, the theory of Logic on a true foundation requires no other statement than this,—that whatever we already know, is necessarily included in the development of our knowledge, and that what we do not yet know,

* Compare Chapter III., Section 7, page 136.

must be reached by observation and experiment, the conclusions from which are not necessary, or included in the facts observed, but are properly called Inferences.

23. In developing our knowledge, we are often said to take our arguments from *Comparison*. Now, all knowledge consists in being aware of relations; and to take an argument from comparison is therefore to take it from the store of all arguments. But a subject already known, may be better understood by seeking and using comparisons that are not a part of our knowledge at the moment of seeking them. Thus, we can feel or understand more vividly, the previously known fact, that novels of a certain kind are injurious, by comparing them to poison. The things known are not of the same nature, and the effects are in the one case moral, in the other physical: still there is the relation of similitude which renders the knowledge of the mischief done by novels more vivid. This topic, namely, SIMILITUDE, is the source of all metaphor in language: as may be exemplified by the previous instance, which appears no more than an ordinary metaphor when we say "Some novels poison the mind;" although, if expressed at full, there would be the same things which every act of knowledge includes, namely, the thing known; the thing by which it is known, or better known; and the knowledge itself. Thus, again, if we wish to understand more clearly the already acknowledged truth, that "The indolent cannot obtain the favour of heaven," we may compare indolent people with idle servants, and Heaven with the master: this, as the things compared are deemed to be of the same kind or nature, cannot so well be called an argument from Similitude, but is more appropriately described as an argument from ANALOGY or PARITY OF CASE. Further, in reasoning from the comparison of things agreeing in kind, we may take those that are known to be directly opposite in their qualities and effects. Thus in order to increase the vividness of our conviction that "Vice is the source of disquiet, that it leads to infamy here, and punishment hereafter,"—we may place these truths, already admitted, by the side of the opposite truths, and say that "As Virtue promotes peace, attracts honour and reputation, and paves a road to eternal bliss," so Vice, &c., which is called an argument from CONTRARIES. Still further; it is possible, in comparing things of the same kind, to take

neither those that have exactly parallel or analogous effects, nor those that have opposite effects, but things that have the same effects so far as they approach perfect identity. Thus if we desire to illustrate the admitted truth that "The wicked are always more or less miserable," we may place it by the side of another admitted truth, that "The entirely wicked are entirely miserable, and other wicked people less so, only in proportion as they are less wicked." And this may be called an argument from PROPORTION. And fifthly, there is a special way of arguing from comparison, when, in order to illustrate an admitted truth, we place it by the side of one of the same kind, which, though acknowledged as a truth, makes its way to the understanding with more difficulty. Thus to understand with greater force the truth that "A man ought to be forgiving to his *friends*," we may place it by the side of another truth, which is admitted, though less liable to be so, and say that "A man ought to forgive even his *enemies;* much more then ought he, &c." And this is called the argument A-FORTIORI, or from a *bolder* assertion in proof of one less bold, that is, less difficult of admission.

24. It is chiefly in these special ways of reasoning from comparison that the phrases CÆTERIS PARIBUS, and MUTATIS MUTANDIS occur. The meaning of the former is, *Other things being equal;* of the latter, *Those things being changed which the difference in the persons or things compared may require to be changed.* Thus we may have occasion to say, "This measure was successful then, and, *cæteris paribus*, will succeed now." "This course and method of study will benefit boys, and, *mutatis mutandis*, may be adopted for girls."

PRACTICAL DISTINCTIONS CONTINUED: ii. NAMES OF ARGUMENTS FROM THE DATA ON WHICH THEY REST.

25. In every act of the reasoning power there are three things: the thing known; that by which it is known; and the knowledge itself, abstracted from the things that suggested it. In the deductive process of logic, the former two things are likewise abstract knowledge; and we may call the one the *datum*, the other, the *argument*, or reason. It is sometimes quite immaterial to which we apply the one or the other of these two names: for instance, when we say, "Three feet are

one yard; thirty-six inches are three feet; therefore thirty-six inches are one yard:" here we may indifferently call the first or the second proposition the *datum* or the *argument;* out of which the third proposition arises as the *conclusion*. The two former propositions are called the *premises*. For the most part, however, the premises out of which a conclusion arises, will, in the deductive process, consist, first of a general proposition which includes many particulars; and secondly of one of those included particulars: the term *datum* will then be properly applied to the general proposition; and the term *argument* to the one included in it: and the argument may, under such circumstances, take its name from the nature of the knowledge which is presupposed or assumed in putting it forth as an argument. It is to be observed, that the doctrine here held seems to belong only to the process of reasoning with other minds, and therefore to Rhetoric, and not to Logic. Yet, even in thinking within oneself, a person may proceed from knowledge more or less deeply founded; and the distinctions laid down under the head which is placed above, are, on this account, claimed for Logic, although they will be properly repeated when we have to consider the practice of Rhetoric.

26. When we develop our knowledge by an argument which is included in such general knowledge as all mankind possess, the argument is said to be ARGUMENTUM AD JUDICIUM, that is, an argument to [ordinary] judgement,—an argument which all people of common sense and ordinary information must admit, as well as oneself. And this is the ground of almost every argument; to which every particular ground—every one, for instance, which is described and exemplified in the six following sections (27, 28, 29, 30, 31, 32), is an exception.

27. When a person develops knowledge in which others have no share, the arguments are fitted to convince himself alone. For instance, if I know, and no one else knows, that "John lived with his uncle," the fact which may be known to many people that "John's uncle always lived in London," is an argument with me that "John lived in London;" but can be no argument with those who have no share with me in the knowledge implied by the first proposition. An argument thus peculiarly founded, is the type of that kind, which

in Rhetoric is called ARGUMENTUM AD HOMINEM, that is, an argument addressed to the knowledge, the principles, or persuasion, entertained by the one man in particular whom they are intended to convince; the difference being *that* which holds universally between Logic and Rhetoric, namely that, in the former, the reasoning is confined to oneself, and the peculiar knowledge is one's own; while, in the latter, the reasoning is applied to convince another, and the peculiar knowledge or persuasion belongs to that other person.

28. When the knowledge we develop is a particular department of learning or science, the arguments are fitted to convince all who are instructed in that part of learning or science, but not to convince people of common or ordinary information. Thus if I know the distance between myself and a certain column to be two hundred feet, and that the angle formed by the lines reaching from my feet to the base and to the top of the column is an angle of forty-five degrees, I shall conclude that the column is two hundred feet high: but this will be a conclusion only to my mind, and to others instructed in the science on which the reasoning proceeds. An argument thus founded is called ARGUMENTUM AD DOCTRINAM, that is, an argument addressed to or derived from some particular part of learning.

29. When we develop knowledge which rests for its truth on the reverence entertained for its source, each included argument takes the name, ARGUMENTUM AD VERECUNDIAM, that is, an argument derived from, or addressed to, the sentiment of reverence or respect. Thus, for instance, if I believe all to be true which a certain respected friend solemnly avers, I shall believe every particular to be true which makes a part of the whole; and the conclusion will be, that since the whole is true, the particular is true.

30. When we develop knowledge which rests for its truth on the religious faith we embrace, each included argument takes the name ARGUMENTUM AD FIDEM, that is, an argument derived from, or addressed to, the religious faith of the person or persons embracing such faith. Thus, with regard to persons who admit the Bible to be the inspired word of God, every particular included in the Bible is admitted to be a part of that revelation, and consequently admitted to be true.

31. In Rhetoric, it is possible to address inferior motives of action, and to keep back, in order to gain some temporary end, the truth as it exists in the mind of the artful reasoner. In Logic, it is not possible so to deceive oneself; but there are ways, nevertheless, by which, even in one's own thoughts, one may wilfully go astray. A person may choose, for instance, to remain in a state of ignorance on a certain subject, when the ways to inform himself are open. Whatever conclusion he may reach while in this state, will be a conclusion derived from ignorance, and the process,—with such difference as the difference between Logic and Rhetoric creates,—will correspond to what, in the latter, is called, ARGUMENTUM AD IGNORANTIAM. Such, for example, will be the process with a thinker, who, having imbibed the opinion that all people that belong to a sect in religion different from his own, are bad people, concludes that A. B., one of these people, is a bad man; which may or may not be true in point of fact, but is not made true by an argument thus derived.

32. Again, it is not only possible, but is the great error of our lives, to be led away from truth in our own thoughts by the allurement or the violence of our passions. In every case of this kind, there are two sets of *data*, the one set abstract, or free from our passions, the other set derived from, or suggested by them. Thus, for instance, the murderer knows that the act he is about to commit, is a crime, but there is some good suggested by his passions, which, in the blindness they create at the moment, seems to outweigh the good he leaves behind; and the conclusion which he reaches, urges him to the deed. Such a case corresponds to the process which, in Rhetoric, is called ARGUMENTUM AD PASSIONES.

PRACTICAL DISTINCTIONS CONTINUED: iii. NAMES OF ARGUMENTS FROM THE FORM IN WHICH THE REASONING IS EXPRESSED.

33. The forms of language are changeable at pleasure, while the reasoning process which gives occasion to the particular form that includes the result, remains, or may remain, precisely the same. Every single word is the fit expression of intellectual acts, not perhaps ascertainable as to all the steps after the knowledge indicated by it has been attained;

but however many those steps may have been, each step in the progress to the result which the word expresses, comprehended three things,—the thing known, the thing by which it was known, and the knowledge itself abstracted from both. Thus the word *man* cannot express the knowledge we have under that word, unless there is first apprehended a creature distinct from other creatures, as, for instance, a creature like oneself, yet not oneself, and in most respects unlike other creatures. Such, or something like it, is the knowledge we include under the name; which knowledge involves the three things stated, the thing known, the thing or things by which it is known, and the knowledge itself. When, afterwards, our knowledge under the same word becomes mature through the force of instruction or of observation, and we understand man as a rational animal, there are still the three things already referred to; for we understand him to be rational because we understand other animals to be irrational, and our knowledge, included under, and abstracted by the word, is the result. We may, if we like, develop the knowledge which this word thus includes, in such a form as the following: "Every creature on earth that is not irrational is man; the creature now under notice or knowledge, is not irrational: therefore the creature now under notice is *man*." These three propositions, the moment they are recognised in their connection with each other, are one expression with one meaning; and the word *man* includes the whole of that meaning; but the word *man* is, in form, a grammatical noun-substantive: the three propositions are, in form, what, in logic, is called a syllogism. Now in this way may every result of the understanding, if not already expressed in the form of a syllogism, be expanded or reduced into that form; and this form, since it represents the three things included in every act of the intellect, is commonly assumed to be the fundamental form, to which every other form is referrible, when we desire to examine its soundness.

34. But the syllogism is a fundamental form, only because it represents, in three distinct propositions, every natural act of the understanding. It has no other merit. Its claim to be demonstrative, that is, to exhibit a *necessary* conclusion, rests on the fact, that the first two propositions, which are called the *Premises*, contain the conclusion. If the premises

are denied, we must go back to another syllogism, and perhaps to another; and if we thus fairly go back to the beginning of our knowledge, that beginning will always be an *induction*, that is, knowledge growing out of two things which do not include the knowledge, but spring from the natural capacity of the intellect, operated upon by the things of sense. A phrase constructed of two words, may represent the syllogism as thus described,—namely the syllogism whose premises contain the conclusion as well as the syllogism whose premises infer it. For example, the phrase, *Reasoning man*, exhibits premises containing the conclusion which the phrase expresses; for he who knows what the word *reasoning* means, must know that it includes *man;* again he who knows what the word *man* means, must know that it includes the power of reasoning which is essential in man. The whole phrase, then, which is one expression with one meaning, exhibits a necessary conclusion out of the premises indicated by the words which form the phrase. This is an example of a phrase representing the syllogism whose premises contain the conclusion. Let us take another example; *Mortal Man.* He whose experience goes so far as to assure him that man is *mortal* universally, that is, including men that live, and men that will live, will find this phrase correspondent with the other: but if the premises should be doubted,—that is, if it should be doubted whether the knowledge we have under the term *mortal* can be applied thus universally to *man;* or whether the word *man* includes thus universally of *man* what we mean by *mortal*, then we have to await further facts in order to confirm or set aside what the phrase expresses. Suppose the facts at length suggest the result, such result will be an *inference*, not a necessary conclusion; till at length the previous knowledge being granted, the conclusion is necessarily granted with it. Now every syllogism drawn out in form, if we deny or question its premises, will lead us thus back to the same state of things, namely, a state in which the conclusion will not be a necessary consequence, but an inference. Hence, then, as there is no *virtual* difference between a syllogism, and any expression constructed of two words that make sense, we may take the latter, namely two words that make sense, as the original, because the simpler form of expression, which Logic employs in the deductive process, and refer all other

forms, including the syllogism itself, to that simpler form of expression. Two words that make sense may not, however, form a sentence or proposition: they may form only a part of a sentence, that is a part of speech. This indeed is of no moment to Logic, if we look only to Logic independently of Grammar. But logic though distinct in theory from grammar, is, in practice, indissolubly connected with it; and hence a complete expression of logical deduction must be at least a sentence. Now the shortest sentence that can be constructed, is that which consists of nominative and verb; and this, as being the shortest and simplest form of expression, may be regarded as the original form in which knowledge is developed in deductive Logic; as, "Man reasons;" "Man dies;" "John lives;" "Fairies frolic."

35. But the noun and the verb, which are the only essential parts in the logical development of knowledge, may each be a constructed part, that is, may be a part indicative of further logical development. Instead of saying "reasons," (see above,) we may say, "is a reasoning creature;" and the whole proposition will then be, "Man is a reasoning creature." The other propositions may be developed in a similar manner. Whether developed in this way or not, the process of the understanding will be the same: the result must always be expressed by instrumental signs, which being joined, form one expression with one meaning. Thus, for instance, the following sentence, when all its parts are put together, is one expression for one meaning, "Man, noble in reason, infinite in faculties, in form and moving express and admirable, in action like an angel, in apprehension like a god, —is a wonderful piece of work." The development of its one meaning is, primarily, into two parts, which two parts may be called nominative and verb. These two parts are subordinately divisible, till we reach the grammatical single parts of speech which form the larger grammatical parts. In Rhetoric, it might be advisable to reach the result by several distinct sentences; and each sentence, in Rhetoric, might advisedly take the form of exclamation: * but these expe-

* For instance, as it stands in Shakspeare, "What a piece of work is man! How noble in reason! How infinite in faculties! In form and moving, how express and admirable! In action, how like an angel! In apprehension, how like a god!"

dients are forms for influencing other minds, not forms which the thinking mind requires for the development of knowledge in order to satisfy itself. This doctrine being admitted, we conclude that the sentence consisting of nominative and verb, however these two parts are subordinately divisible, is the original or primary form in the logical development of knowledge.

36. Still, as the custom of Logic, from time immemorial, has been, to refer all forms of speech to that of the SYLLOGISM; and as this agrees essentially with the doctrine unfolded in the previous remarks; there is no necessity to oppose such reference. The following names and distinctions, which assume the syllogism for their foundation, may therefore be acquiesced in: *

37. An EN'THY-MEME is a form of language which includes the three propositions of a syllogism, while it expresses only two of them. Thus, if we say, "Brutes are not rational agents, and therefore are not accountable," we imply, but do not express the datum, "None but rational agents are accountable." Again, when we say "John lived in London; for he lived with his uncle;" the reason given in the second proposition for what is stated in the first, includes the datum that his uncle lived in London; since without that datum, it would be no reason at all.

38. A SORI'-TES is a form of language which includes two or more syllogisms, while it so expresses the reasoning, that each proposition is the ground of the following one, till we reach that in which we design to rest: in other words, it is the *accumulation* of one argument upon another; as, "Man is a creature endowed with reason and liberty; every creature so endowed is accountable for his actions; an accountable creature will be punished for his evil, and rewarded for his good deeds; therefore man will be punished or rewarded."

39. A Logic which builds its principles on the arbitrary

* The reader has to be admonished, that in all these remarks, we are contending against the formal logic of Aristotle, of which the pervading characteristic, is, to attribute to the changing forms of language essential differences of mental act. Against such doctrine, a more explicit opposition is offered in the sixth chapter of this work; to which chapter the reader is referred for a better understanding of the purpose of the several remarks now in progress.

forms of language, so that the parts of speech, whether simple or compounded, are made to act differently and distinctly in the process of coming to a conclusion from premises, is an art quite apart from the Logic treated of in these pages. The former is the art of reasoning *with* words, so as to keep the things signified as much as possible absent from the understanding: the latter is the art of reasoning by *means* of words so used as to keep the things signified ever present to the understanding, in order that our conclusions may be, not from the words, but from the things they signify. Now with regard to this logic, which is the logic existing in the common daily use of language, the grammatical character of a word, or the peculiar form of a phrase or sentence, is unessential to the validity of its acts. It is, for instance, of no moment in our logic, whether we say, *Man*, or *Reasoning man*, or *Man reasons*, or *Man is a reasoning creature*, the thing meant being in each the same, and the whole of the words in the last example forming one expression for the one meaning expressed by the first. True it is that we are called upon, by the form of the first, and of the second expression, to esteem the expression only an instrument of meaning to be developed, and not as meaning yet developed; while, with regard to the last two examples, we are at liberty either to rest in the development so far made, or expect it to proceed further; and in this way Logic accepts the ministry of Grammar: but the differences are unessential in logic, and belong, properly, to the other department of learning. In our logic, again, it is of no moment whether we say, *Every man is liable to error*, or, *No man is free from the liability to error*, since each proposition, as one expression for one meaning, stands for the same meaning; and since each resolves, primarily, into two parts, namely the former proposition into *Every man*, and, *Is liable to error;* the latter, into, *No man*, and, *Is free from the liability to error*, out of which two parts, in the respective instances, the same one meaning springs. When therefore, the former is called an affirmative, and the latter a negative proposition, we leave the distinction to grammar, and consider that logic is in no way concerned with it, though in Rhetoric there will generally be a ground of preference for the one or the other. In our logic, once more, it is of no moment whether we say, *Kings, like other*

men, are mortal, or *If kings are men, they are mortal;* whether we say, *If the world is a sphere, we must be able to reach the same point, by moving from it in any one direction;* or *The world being a sphere, we must be able*, &c. We may admit the one form in each of these instances to be called a *categorical* proposition, and the other a *hypothetical* or *conditional* one: we may also admit, on rhetorical grounds, sometimes the one, sometimes the other, to be preferable: but we do not admit that Logic, in its own strict province, has any concern with such differences, either in propositions, or in the syllogisms which may be developed from them.

40. There is, however, one description of syllogism, whose difference from others our logic acknowledges, because it is not a mere difference in form of expression, but a peculiarity in the character of the knowledge developed. The syllogism referred to, is called the DILEM'MA; a form of expression never justly possible but when the knowledge to be developed includes something true and something not true, while it does not include which is which: for instance, the knowledge or datum, that *The blessed in heaven will be fully content, either because they will have no desires, or because their desires will be completely gratified*: the knowledge or datum, that *Æschines joined in the public rejoicings, in which case he is inconsistent; or did not join in them, in which case he is unpatriotic*: the knowledge or datum, that *A certain man spoke irreverently of scripture in jest, in which case he is not wise; or in earnest, in which case he is not good.* These, unfolded into syllogisms, will be examples of the Dilemma; as,

"If the blessed in heaven have no desires, they will be fully content; so they will if their desires are completely gratified; But either they will have no desires, or have them completely gratified: Therefore they will be fully content."

"If Æschines joined in the public rejoicings, he is inconsistent; if he did not, he is unpatriotic; But he either joined or not: Therefore he is either inconsistent or unpatriotic."

"If this man were wise, he would not speak irreverently of scripture in jest; and if he were good, he would not do so in earnest: But he does it either in jest, or in earnest: Therefore he is either not wise, or not good."

The manner of reasoning called *Reductio ad absurdum*, (bringing to an absurdity,) may be mentioned with the

dilemma, as requiring, like it, a double supposition; the difference being that it completely establishes one of them; as, "This road to our house is either straight or crooked. I affirm it to be straight, but I have no direct proof: say, then, that it is crooked. But it is of the same length, and extends between an equal distance, with one which we know to be straight. Thus we have two lines of the same length, and extending between an equal distance, the one by admission straight, the other by supposition crooked; which supposition is absurd. Therefore the line or road in question is not crooked; that is, it is straight.

41. An EPICHIRE'MA is a syllogism with arguments or proofs appended to one or both of the premises. Let the following syllogism be the foundation of an epichirema:

Datum.—"An event that has always followed an act, will continue to follow it when circumstances are the same.

Argument.—"Death has always quickly followed the drinking of this juice.

Conclusion.—"Therefore, the circumstances continuing the same, death will, in this instance, quickly follow the act of having drunk of this juice."

The following further development will give to this syllogism the name Epichirema:

Datum.—"An event that has always followed an act, will continue to follow it when circumstances are the same. This is not a necessary truth, but the persuasion of habitual experience, and we acknowledge its certainty by calculating, without hesitation or doubt, on issues that have often been tried.

Argument.—"Now the drinking of this juice has always been quickly followed by death; as I can affirm from instances that have come under my own observation; from many more that have been reported to me by friends; and from innumerable others which past recorded experience bears witness to.

Conclusion.—"Therefore, unless something can instantly be done to change the circumstances in the present case, death will quickly follow the act that has been committed."

In this laborious way does Logic, if left entirely to its own mode, develop knowledge—Logic which is without passion, —without impulse to action. Rhetoric would be much more brief notwithstanding her repetitions,—"He'll die! he'll die! he has drunk poison! Oh! for an antidote!" Virtually, we here have the whole of the previous argument, with emotion, and urgency to action, superadded.

Practical Directions continued: Exercises suggested for Improvement in Logic.

42. There can be no proper practice of Logic which is different in principle from that which directs the ordinary use of language. In the previous pages we have been employed in ascertaining what that principle is; and now that we know it, we have to act upon it as before, but with the caution which theoretical knowledge confers. It is true that the ordinary use of language aims at rhetorical effect as well as logical precision; in other words it is meant to influence others, as well as to develop the knowledge in the reasoner's mind. But in practice it is not wise, nor would it be easy, to separate Logic from Rhetoric by any very rigid line: for Logic is the proper ground of Rhetoric, and the practice of Rhetoric includes or ought to include Logic. In following such exercises as are hereafter suggested, the learner is therefore only cautioned against any style which dispenses with a patient and laborious employment of thought; but provided he fulfils his duty in the clear development of his own knowledge, he needs not be the less satisfied, if his language has a correspondent effect upon other understandings.*

43. Improvement in Logic is best promoted by the writing of what are called Themes. The word *theme* properly means the subject of a discourse; but the discourse itself, if merely an exercise, is also called a theme. We begin with a title, which title may be a single grammatical noun, or a logical noun, or a proposition.†

44. The title or subject of a theme being a mere grammatical noun, will be the name of a thing *real*, or *ideal*, or *metaphysical*; ‡ while the name itself will be *proper*, *common*,

* Compare Section 1 of the present Chapter, p. 140.

† Compare Section 7 of the present Chapter, p. 145.

‡ Compare Sections 18, 19, 20, Chapter II. pages 117, 118.

or *abstract*. Thus *Solomon*, *Socrates*, *Alexander*, *King Alfred*, *Homer*, *Virgil*, *Shakspeare*, *Milton*, *Aristotle*, *Bacon*; *London*, *Rome*, *Paris*; *Thames*, *the Rhine*; *Vesuvius*, *the Alps*; are proper names of real persons and things: *Ceres*, *Bacchus*, *Queen Mab*, *Lilliput*, *Brobdignad*; are proper names of ideal persons or things: *Animals*, *Vegetables*, *Minerals*; *Man*, *Beast*, *Bird*, *Fish*, *Insect*; *Tree*, *Shrub*, *Herb*; *Earth*, *Stone*, *Metal*; * *Fire*, *Air*, *Earth*, *Water*; are common names of real things: *Fairies*, *Ghosts*, *Fauns*, *Nymphs*; are common names of ideal things: *Virtues*, *Vices*, *Qualities*, *Attributes*; are common names of things metaphysical. *Faith*, *Hope*, *Charity*; *Prudence*, *Justice*, *Temperance*, *Fortitude*; are names abstract of things metaphysical. And any one of these becomes the title of a theme by putting the word *On* before it.

45. Among the previous classes of names or subjects, that of most frequent choice or occurrence will be the last,—a thing metaphysical under a name abstract: of which the following are given as further instances, with hints subjoined to assist the learner in developing his knowledge.

On Conversation. *On Writing*. *On Reading*. *On Travelling*. *On History*. *On Building* or *Architecture*. *On Sculpture*. *On Painting*. *On Music*. *On Poetry*.

These are things exercised, or done, or known, and imply persons who exercise or know them. Hence they are things metaphysical, and the cautionary principles † must be kept in mind. The generic name will be, an ability or practice, an art, a science: an art may be further developed by the distinction mechanic; or fine,—(ornamental;) and the specific nature or more particular description will complete the first point. Then may come some one, or more, or all of the following points: the improvement or the use derived or derivable: the pleasure derived or derivable; the abuse or omission, and consequent disadvantage or mischief. In some instances, the progress of the art or science from early times to the present may be glanced at. Such are the points which may be taken in treating the foregoing subjects.

* Ordinary and not scientific knowledge, is aimed at in suggesting these titles.

† In Chapter II. Sections 15, 16 at pages 114, 115; and Sections 20, 21 at page 118.

These being left for the learner to develop,—one, or more, or all,—another subject of the same class is added, with a development appended by way of example.

"*On Observation.*

Observation is the practice of using the natural powers of sense and understanding, so as to reach and retain all the knowledge we can. With regard to this practice, there are great differences among us. Some, with powers naturally good, and with extensive opportunities of gaining the wisdom that grows with experience, seem to pass through life with their senses and understanding closed, and leave the world almost as ignorant as they entered it. They hear wise converse, and read wise books, but derive no practical advantage from either. They see others fall into difficulties and dangers, of which the causes and consequences are easily traceable; but they neglect to trace them, and learn nothing by which they may avoid the same mischiefs. They travel through countries, and see new manners and customs; but they make no comparisons, nor draw any useful conclusions. In short, their minds resemble a stagnant pool of water, which, if it collects anything, covers itself only with weeds. In the meantime, there are others, whose sphere of remark is very limited, but who appear nevertheless to gain experience at every step, and to grow in wisdom as they grow in years.

The difference which has been alluded to, arises from nothing but the imperfect exertion of the natural powers in the one case, and their proper and active use in the other. A habit of inattention, or a habit of quick-sighted observation, appears to be gained or lost, much in the same way as habits of bodily indolence or activity are gained or lost. It is the determination of the will, or the want of it, that in either case, produces the good habit, or allows the evil one to form itself. Let us determine to keep the senses and the understanding closely applied at proper times to their appropriate objects; and, with perseverance, the good habit will be gained, and the evil one avoided."

The following are other instances of subjects that are things metaphysical under names abstract:

On Curiosity. On Hope. On Fear. On Anger. On Pride. On Humility. On Envy. On Emulation. On Piety. On Patriotism. On Generosity. On Selfishness. On Avarice. On Prodigality.

The generic name of these will be, a principle in human nature, or an impulse, or a feeling, or a sentiment, or a passion. The particular description from the effects produced will be the difference. The definition thus made out, the next point may be, the benefit or the evil. In some of the subjects there will be both a benefit and an evil, depending upon the proper and ill regulation of the principle, the sentiment, or passion. Instances from history, or from experience may be added to verify the previous conclusions. It must be observed, further, that some of the subjects, as *Hope* and *Fear*, *Pride* and *Humility*, are so obviously opposed in nature, that the one cannot be considered without reference to the other. Of others, though not opposed, it must nevertheless be observed, that the one cannot be accurately distinguished without some allusion to the other; for instance, *Envy* and *Emulation*, which are passions that spring from the same root, namely, a desire of superiority, but differ by growing the one in a base, narrow, selfish mind, —the other in a generous one. *Courage* and *Fortitude* are subjects that require also to be distinguished, not on the same, but on peculiar grounds. As an example to guide the learner, the latter of these subjects is developed under certain points hereunder:

"*On Fortitude.*

Fortitude and Courage are not synonymous words, though each quality in some degree implies the other. Fortitude is passive, Courage is active. Fortitude is strength to endure pain, or other calamity; Courage is the absence of dismay in meeting and contending with that which threatens pain or death. Yet a courageous man can scarcely maintain his title, if he has no fortitude: a woman of fortitude can scarcely be so deemed, if she has no courage.

We may distinguish these virtues by other marks.

Courage is much more frequently a constitutional quality, than one derived from thought and moral principle: the other may also be constitutional, but it is much more frequently derived from the latter source, or at least improved by aid from it. Men are more courageous than women, because with them the bodily frame is stronger. Women are often found to have more fortitude than men, partly from a difference of constitution, but frequently because religious or moral feelings are purer and stronger in them than in the other sex.

But equally in woman and in man, Fortitude is a quality indispensable to the perfection of the human character. We are born to pain, or to calamity that produces or threatens pain. Without strength to endure, the pain or calamity is more than doubled, and a person who has no portion of such strength, is not only more miserable than they who have it, but is less respected and esteemed.

The question however remains, whether Fortitude depends upon discipline, or is altogether a gift of nature. We may safely answer that the best source of Fortitude is religious and moral instruction. It will aid natural strength where nature is already strong: it will supply it where nature is weak. He who, in affliction, feels that the hand which afflicts means the transient evil for future good, will be able to bear the weight of that hand without repining. Like the virtuous Job of old, he will rise above his trials, and, like him, will find, sooner or later, a reward for his endurance."

46. We have seen * that the arguments or *means* used in developing knowledge, are internal or external; in other terms, subjective or objective. When the name or title of a theme is immediately applicable to an external thing, that is to a real, or an ideal thing, and not immediately to a thing metaphysical bearing an abstract name, the difficulty of de-

* Section 12 of the present Chapter, page 148.

velopment is increased, because the thing presents itself under a double aspect,—namely in its individual, outward, *objective* shape, and as a *subject* that may be traced from the stores which the mind has already appropriated; stores which may be said to be already a part of the mind itself. Let us say, for instance, that *Socrates*, the proper name of an individual person, is proposed as a theme: to treat this objectively would be, to detail the facts belonging to the individual,—the place and time of his birth, who were his parents, what were the acts and events of his life, what the time and manner of his death. But we may omit these facts or take them for granted as known to all persons of education, and confine our development to thoughts generated by these facts, so that in truth the theme would more properly be entitled, *An Estimate of the Character of Socrates*, or *Thoughts on the Character*, &c. Thus named, and thus pursued, the theme would class with those already exemplified, namely a metaphysical subject under a name abstract; for the several words form one name with one meaning; and that name taken as one, is a name abstract. We are at liberty, however, to develop our knowledge in both ways; and all that, in such case, we have to remember, is, to keep the points clear and distinct both in thought and in expression, and not to let the single name *Socrates* be a hindrance to the fixing of proper points for consideration.—Let us take, for another instance, the common name *Man*, as including knowledge proposed to be developed by a theme:—how shall we proceed? We are distracted at first by the apparently interminable considerations that spring indistinctly, like blending rays, from this centre. To consider man objectively requires the thinker to be an anatomist, a physiologist, a tracer of the race in every variety which climate or original constitution has generated; which is to expect more than can be fulfilled by any one person. For an ordinary theme, if some objective points are taken, they must be such as present themselves to every observer; as for instance the human shape compared with that of other animals; and the superior intelligence by which the strongest and most cunning of those animals are subdued. But under the name *Man*, it is not uncommon to find that the knowledge developed is merely subjective; which happens when *man* is

considered not in his physical, but only in his moral relations.* The title in this case would strictly be, *On the Moral Relations of Man;* and thus named, the theme would class with those already exemplified.—Let us take, for a third instance, the plural word *Ghosts*, a name of certain things ideal: an objective development of knowledge under this title, would be a description of the times, the places, and the appearances of ghosts, either according to special reports, or founded upon opinions that are, or have been prevalent. But, retaining the title, all objective reference to ghosts might be omitted, and the theme pursued subjectively, as if the title had been, *On the Belief in Ghosts:* when it would appear to be a theme classing with those already exemplified.

47. It further appears from what precedes, that the title of a theme may be a grammatical noun-substantive, as *On Ghosts*, *On Knowledge*,—or a logical, that is a constructed noun-substantive, as *On the Belief in Ghosts*, *On the Knowledge of the World.* But a proposition, a moral saying, or a proverb, may be placed as the title of an exercise; as, *A proper Knowledge of the World is favourable to Virtue: Trust not Appearances: Honesty is the best Policy.* A theme thus given out is commonly called a *Thesis.* There is, however, no essential or necessary difference between a thesis and a theme,† except the form of title; for without requiring any change of what may have been developed under one form, the title may at pleasure take the other form; as *On the moral Advantages of a proper Knowledge of the World: On the Danger of trusting to Appearances: On the Policy of being Honest.* The following exercise, for instance, which is called a thesis, would be a theme, by such change of title as is suggested above.

"*Trust not Appearances.*

It is highly imprudent to be guided in our opinions and conduct by first appearances. For the worst of

* Pope's poetical Essay on Man is an instance.

† The terms, moreover, are etymologically the same. Some teachers make a difference between both of these, and an Essay. Such distinctions, being, as they are, distinctions without a difference, are made either in ignorance, or for the sake of practical differences which would be better indicated in some other way.

persons and of things wear at times the most engaging aspect: the wily thief approaches in the garb of scrupulous honesty: the corrupter of hearts carries on his brow nothing but benevolence and candour: vices of every kind assume the guise of virtues: and pleasures that end in misery promise, at first, nothing but delight. In things of less importance, deception and fraud are equally common. The unjust trader gives a false appearance to his wares; and mere empirics in art or science make larger promises than they who are really skilful.

This description of what we meet with in the world is supported by further proofs. It is because the arts of deception are spread in every direction, that parents are careful to impress on their inexperienced children the necessity of caution. It is on this account that all reflecting people consider the heedless, the giddy, the easily-confiding, to be in constant danger. It is for this that, as we grow in years, we alter many, if not most of our judgements, and become more suspicious even when, by an increase of our experience, we are less in danger of being deceived.

The world may be called a garden abounding with noxious fruit, among which much may be found that is wholesome: but unfortunately the far greater part of the former is more enticing to the eye, and, on first taste, far sweeter than the latter. If the simile has any truth in it, we are warned never to pluck and eat without the utmost caution.

Poets as well as moralists bid us beware how we trust to the world. Shakspeare calls it

> ——— the guiled shore
> To a most dangerous sea, the beauteous scarf
> Veiling an *Indian* beauty; in a word,
> The seeming truth which cunning times put on
> To entrap the wisest.

As to History, it is full of practical warnings on the subject before us. Let us take one as an example of the rest. When the Greeks, after a ten years' siege, found themselves unable to take Troy by force, they feigned an abandonment, and left behind

them a large wooden horse filled with armed men. This being dragged into the city by the credulous Trojans, the men left their concealment in the night, opened the city gates, and gave admission to the besiegers. Thus fell Troy: and thus are all persons liable to be lured to their destruction, who will not mistrust appearances when there is danger of being deceived.

Let us, then, in passing through life, never be too secure or confiding,—but when new doctrines are offered to our notice; or new inventions that throw the old into the shade; or new acquaintances whose manners are more engaging than those of tried friends, —let us suspend our judgement, and not be carried away by first impressions: let us wait till time and experience furnish some sure grounds for the opinion we are inclined to form, or the conduct we are disposed to pursue."

The points signified by the several divisions or *paragraphs* of this example, are named, by some teachers, the PROPOSITION and REASON; the CONFIRMATION, or additional reasons; the SIMILE; the QUOTATION or testimony; the EXAMPLE; the CONCLUSION.* Such divisions may, or may not occur in the development of knowledge under any other title.

The following are other theses on which exercises may be written: *Home is home.—A rolling stone gathers no moss.—A burnt child dreads the fire.—Charity begins at home.—There's many a slip 'twixt cup and lip.—Necessity is the mother of invention.—Harm watch, harm catch.—Let the shoemaker keep to his last.—Ignorance is full of wonder.—Nothing venture, nothing have.—Well begun is half done.—Enough is as good as a feast.—'Tis an ill wind that blows nobody good.—Tread on a worm, and it will turn.—Penny wise and pound foolish.—Take care of the pence, and the pounds will take care of themselves.—Good words cost nothing.—Better lose a jest than a friend.—Pardon others, but not thyself.—He lives long enough who hath lived well.—The worst of crosses, is, never to have had any.—Fools rush in where angels dare not tread.*

* The several topics (see Sections 12–24) whence the arguments are derived for the parts of this exercise, are, for the Reason, *experiment;* for the Confirmation, *effects;* for the Simile, *comparison;* for the Quotation, *testimony;* for the Conclusion, *adjuncts.*

CHAPTER V.

ERRORS TO WHICH LEARNERS ARE LIABLE IN ATTEMPTS TO DEVELOP KNOWLEDGE.*

1. Experience in aiding pupils to develop their knowledge, will soon make manifest that, according to the disposition of each, and the qualities of his understanding, he will infringe the laws of logical deduction in one or the other of the following ways:

1. By VERBIAGE;
2. By CONFUSED REASONING.
3. By DISJOINTED REASONING;

VERBIAGE.

2. Verbiage is an *art* which stands by itself: it is the art of joining well-sounding words into correct forms of sentences, with little or no regard to any resulting sense; the art of using language grammatically, but not logically; the art of *appearing* to reason, and employing words for this end, but of employing them in the absence of the knowledge which they ought to include. We here call it an *art*: it is an *art* in the bad sense of the term.

† A pupil who has read, but has not thought a great deal, will have his memory stored with book phraseology, but will be deficient in such knowledge as may be justly called his *own*. He can supply this deficiency, only by a determination carried into practice, of reasoning from *things;* and, consequently, of going back to the inductive process, whenever his knowledge of things shall fail him. But if, instead of taking this course, he seeks only to make a parade of knowledge, by joining terms and phrases familiar to his memory which look well to the eye, and perhaps sound well to the ear, his beginning exercise will, in kind and character, resemble the following example:

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* Much of what follows, and portions of what precedes, I have already published in a little work called "Practical Logic, or Hints to Theme-Writers," which first appeared in 1823. I state the fact, lest it should be thought I have borrowed from certain compilers of grammar what they have borrowed, without acknowledgement, from me.

† The pupil pursuing the First Course indicated in the Appendix, will do well to read what immediately follows, but the question put to him will be sufficiently met by what precedes. Wherever a correspondent remark is needed hereafter, this note will be referred to.

"*On Education.*

The invaluable blessings of a refined education, are so multifarious in their extent, and so incalculable in their essence, that the understanding and the imagination are equally unable to comprehend the phenomena involved in the boundless subject. Who, indeed, can justly appreciate the ineffable advantages which accrue to gifted individuals, ardent to exhume the germs of scientific lore, and attain the opulent results of disciplinary progress? Educational instruction exalts the faculties, animates the mind, improves the understanding, and, by throwing a divine light on the abstract operations of human intellect, gives a new grace to the whole character. Through the instrumentality of the influence which education alone can impart, we are lifted to another sphere. In short, education is the first of things, the master-key, the universal good; and we are bound at once to reverence its authority, and apply to its pure fountain for mental delight, and intellectual improvement."

Let it be supposed that this exercise has been written by a pupil, after a conversation with his teacher on the subject to be developed. Now, when a pupil makes proper use of a conversation so given in aid, the fact that all the immediate knowledge he develops has been supplied by the teacher, is no impeachment of the soundness or reality of the pupil's knowledge: for all our knowledge is acquired chiefly from what others communicate: how, and at what time, is of little moment, provided the instructed mind completely embraces and appropriates the knowledge. But there is this difference between two pupils so assisted by a teacher: the one forgets the phrases, and forms of speech, because his understanding has been intent on the things signified, and not on the words; and, therefore, in embodying the reasoning, his style will be his own, not an imitation of his teacher's: the other carries away little more than words and phrases, such as he has been accustomed to admire in reading, and these he puts together in the best way he can, so as to form an exercise more or less resembling the example just given. Such an exercise is not a beginner's essay in methodical *think-*

ing: it is an exercise in an *art* whose purpose is, to conceal the absence of distinct thought: and the teacher, to do his pupil justice, must run his pen through the whole essay, and require a new beginning upon what, to such a pupil, will be altogether a new principle. Not so with the other supposed pupil. Let the expression of thought be ever so poor and meagre, yet if his exercise contain clear evidence that the mind has been at work on the subject suggested, it ought to be accepted as a beginning of logical effort: improvement will come with practice, if the early deficiencies are pointed out and understood. The faults which such a learner is likely to commit, are described and exemplified under the two general heads that follow:

Confused Reasoning.

3. This fault, when it becomes evident in language, will be found to arise from the absence of proper distinctions and divisions.

* The following, which is an exercise by a very young logician on the same subject as the previous example, and may be supposed the result of the same previous suggestions, will serve to show the nature of the fault.

> "*On Education.*
>
> Education is certainly one of the most important things which belong to man, and the most useful and essential of any, if we reflect what a wild savage race we should be, if it were not for this inestimable blessing, and how very fortunate they ought to think themselves who have friends both able and willing to provide the means of it, without which we should not know the Author of our existence, to whom we are indebted for all our blessings and comforts, and we should not be able to provide for ourselves, for it is not the same with man as it is with birds, which instinct teaches to provide for themselves when they leave the nest of their parents, instead of which we are not only made agreeable in society, but if we

* See the second foot-note, page 180.

make a proper use of it, it is the source of all happiness, and therefore since we are sensible of its worth, let us who possess it think ourselves unspeakably happy, and never think it too much trouble to obtain, for surely it is the least we can do for such a valuable benefit."

This production, deficient as it is in all the other requisites of good composition, is not without some evidence of real thinking. Let this, then, serve as an example of the first formal attempt in the art which is treated of in these pages. The correction of the exercise, with a clear understanding, on the pupil's part, of the nature and purpose of the corrections, will complete and constitute his first practical lesson in logic. Let him observe, then, that he has run on, from the beginning to the end of his exercise, without a single division; and that he has used no stop but the comma, till he has reached his full stop at the end. Now, though it is true that grammar is one thing in theory, and logic another, and that the stops are regulated by grammar and not by logic; yet grammar and logic go together in practice, and there cannot be confusion in the former, that does not tend to obscurity in the latter. Let him, therefore, look with the eye of a grammarian on his work, and he will see that grammatical construction is often complete, where he has put only a comma. Complete construction always requires one of the higher stops,—strictly the periodic or full stop, but at least the colon or semi-colon. The logical connection is not broken by these marks of grammatical completeness, but, on the contrary, is made clearer. Construction may and must frequently pause, while the logical process continues, supposing this process to be of any length: and these constructional pauses must be indicated by the usual points. Further, let the learner observe, that his line of argument naturally diverges from two points, namely, 1. *The importance of education;* and, 2. *Our consequent duty as young students;* so that the whole theme separates into two subjected themes, that ought to be implied, though not formally named, by a division or break in the writing, exhibiting the whole theme in two *paragraphs*. Thus by logical subdivision and grammatical division, with a few minor corrections, the whole theme will take the following shape:

"*On Education.*

Education is the most important and essential concern of man. For let us reflect what a wild, savage creature he would be, without this inestimable blessing. He would not know the Author of his existence, to whom he is indebted for all his comforts. He would not be able to provide for himself. For it is not the same with man as it is with birds: they know, almost entirely by instinct, how to provide for themselves; but all knowledge necessary to man comes by education. It is education which lifts him from his helpless state, makes him an agreeable member of society, and prepares him for all happiness.

Since, then, education is so important, let us to whom it is offered think ourselves unspeakably happy, and never imagine we can employ too much pains to secure all its advantages. Let us reflect how very fortunate we are, in having friends both able and willing to provide the means of instruction; and let us show our gratitude by our willingness to learn; which is surely the least return we can make for benefits so valuable."

Disjointed Reasoning.

4. Disjointed Reasoning is the development of knowledge in parts not properly connected with each other. The propositions may be separately true, but the truth of the one does not lead to, or flow from that of the other.

* Warned by the confusedness which appeared in his first attempt, and aiming at the greater distinctness of the corrected copy, the learner will, perhaps, at the next attempt, produce an exercise formed of sentences after the following manner:

"*On Friendship.*

Friendship is a subject which has often employed the pen of the moralist. We all feel that friendship is necessary to our happiness. Many persons pretend to be influenced by friendship, who are incapable of

* See the second foot-note, page 180.

so noble a sentiment. Without a friend, the world," &c. &c.

Sentences of this kind do not form discourse:—they indeed all relate to the same subject or *theme* in one sense of the word, but they do not constitute a theme in the other sense:* they are so many distinct propositions, and ought indeed not to be written down in immediate succession, but with breaks in the manner of paragraphs, thus:

"Friendship is a subject that has often employed the pen of the moralist."

"We all feel that friendship is necessary to our happiness."

"Many persons pretend to be influenced by friendship, who are incapable of so noble a sentiment."

This is the way to write maxims or proverbs, but a theme must be managed very differently. We must not start from one proposition to another which has no immediate relation to it, but consider in what way our knowledge may be further and further developed in the direction which the initiatory proposition indicates, till nothing more in this direction seems necessary to be said. Suppose a proposition should appear destitute of a purpose which can be thus carried out, we must either reject it altogether, or, by some addition, give it a purpose with relation to what we choose shall follow it. The first of the foregoing propositions will exemplify what is here meant,—"Friendship is a subject that has often employed the pen of the moralist." It seems hardly worth while to make this observation for the sake of itself;—we expect something to follow which may define its purpose: for example:

"*Friendship is a subject that has so often employed the pen of the moralist*, that the few thoughts it may suggest to my mind, cannot be either novel or striking. Yet my remarks, though trite, may deserve some attention, because the subject itself is of the highest importance."

Thus carried out into a rational consequence, and a rejoinder to that consequence, the original proposition becomes a proper introductory paragraph. The next independent proposition may now be taken, and followed up thus:

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* See Section 43, page 171.

"*We all feel that friendship is necessary to our happiness.* Individually weak, we stand in continual need of assistance, support, advice, and sympathy. But the coldness of the world, and even the indifference of our own hearts to all except a few by whom we are surrounded, soon teach us, that, without sincere friends, we may look for these good offices in vain. Therefore, we always flatter ourselves we possess friends, though there are many who pass through life unendeared to a single heart, and who are never served or assisted but through motives of interest or of fear."

This paragraph being completed, we may take the next independent proposition as the ground for a third:

"*Many persons pretend to be influenced by friendship, who are incapable of so noble a sentiment.* The selfish cannot feel it:—they will connect themselves with others to reap some immediate advantage, but they are ever strangers to that regard which frames to itself a happiness out of the happiness of others: all their views are of profit or of pleasure solely to themselves. Yet none are more ready than the selfish to give the colouring of friendship to all their actions; because they know this to be the most likely means of securing the return of greater benefits than they yield."

It is to be observed that not only should the sentences of the same paragraph be logically connected, but the paragraphs themselves should have a closer relation than merely that of treating of the same subject. Therefore, though the foregoing paragraph may not be liable to any objection in itself, yet when placed beside the other, it appears to be defective by not being consequent on what preceded it. This fault may be corrected, by drawing such a consequence from the second paragraph as may serve for the ground of the third: for example:

"As friendship is so important toward the happiness of life, we cannot be too careful in our choice of friends, lest we place a reliance on those who will desert and betray us in the hour of difficulty and distress. For it is but too true that many persons pretend to be influenced," &c.

A short practical conclusion carried on from the word "yield," in unison with the commencement thus prefixed to the paragraph, will give a finish to the whole theme: thus:

"Against such pretended friendship, let confiding generosity be ever on its guard."

5. Thus it appears that a theme ought to be free from verbiage,—that the parts ought to be properly arranged,—and that the thoughts should flow from, and support each other. Every fault which the learner is likely to incur, will be some special mode of violating one or the other of these three general rules.

Under VERBIAGE, the more special names may be, *Petitio principii*, a Latin phrase, implying *the demand* (for our proof) *of the very thing to be proved*: *Non-sequitur*, another Latin phrase, which means, that what is appended as a consequence, *does not follow* as a consequence: and *Error in distinction or division*, which amounts to no distinction or division at all. Again; Petitio-principii may so occur as to allow of still more special designations, namely, *Begging the question; Identical proposition; Explaining a thing by itself;* and *Reasoning in a circle.* So the fault of Non-sequitur may occur in such a manner as to be designated, *Irrelevant premises*, in which the inconsequence is obvious; and *Proving too little*, or *Proving too much*, in which the inconsequence is real, yet less obvious. So, again, Error in distinction or division, branches into *Distinction without a difference*, and *Confusion of cross divisions.*

Under CONFUSED REASONING, the special descriptions of fault may be, *Saying other than is meant; Not distinguishing different senses of the same word; Neglecting the means of distinction and division which grammar provides for the clear development of thought.*

Under DISJOINTED REASONING, the special descriptions may be, *Omitting necessary propositions; Proposing too much or too little; Deviation from the proposition; Discoursing short of the proposition; Discoursing wide of the proposition.* All these may have for their general title, as well *Disjointed Reasoning* as the Latin phrase *Ignora'tio elen'-chi*, which implies—forgetfulness, or omission, of the point to be made out or developed.

The following synopsis will render the previous explanation at once intelligible:

- VERBIAGE,
  - *Petitio principii*,
    - Begging the question.
    - Identical proposition.
    - Explaining a thing by itself.
    - Reasoning in a circle.
  - *Non sequitur*,
    - Irrelevant premises (void of consequence)
    - Proving too little, } real inconsequence.
    - Proving too much, }
  - *Error in distinction*,
    - Distinction without a difference.
    - Confusion of cross divisions.
- CONFUSED REASONING,
  - Saying other than is meant.
  - Not distinguishing different senses of the same word.
  - Neglecting the means of distinction and division which grammar provides for the clear development of thought by words.
- DISJOINTED REASONING, } *Ignoratio elenchi*,
  - Omitting necessary propositions.
  - Proposing too much or too little.
  - Deviation from the proposition.
  - Discoursing short of the proposition.
  - Discoursing wide of the proposition.

ERRORS IN DETAIL WHICH COME UNDER THE GENERAL HEAD OF VERBIAGE.

6. BEGGING THE QUESTION is verbiage exhibited in such form of the *petitio principii*, that the pretended reasoner, in a more palpable way than under the other forms, begs *that* to admitted for a reason of what he asserts, which is no reason at all, but only the assertion repeated in the same, or in tantamount words: as,

"Pride is odious, because it is disliked by all; for it produces universal hatred."

Here, the words *because* and *for*, lead us to expect a development of the cause that makes pride odious, and of the effects which prove it so; instead of which we have two propositions which only repeat, in tantamount words, what the first had said. Omit the words *because* and *for*, and the defect disappears. We shall indeed have three propositions each meaning the same thing; but such repetition, though logically superfluous, is not always a fault in rhetoric, and in the present instance must be indulged by logic, as minister to the sister art; as, "Pride is odious;—it is disliked by all;—it produces universal hatred." Such is one way of correcting the fault, namely, by not raising the question of the truth of what is asserted, and therefore making no pretence of giving a reason for it.* But the mode of correction more agreeable

* To give a reason is but to develop our knowledge with greater detail. We have always to judge whether this is, or is not expedient. In saying *Pride is odious*, we already express a conclusion from premises, namely

to logic will be, to carry out the purpose of *because* or *for*, by adding a legitimate reason; for instance, "Pride is odious; because our self-love makes us feel it as an injury done to our own importance;"—which is an argument from the topic *cause*: and "Pride is odious; for all persons shun the society of the proud;"—which is an argument from the topic *effect*.

7. IDENTICAL PROPOSITION. This form of *petitio principii* differs from the last in no greater degree than its name indicates. It is a grammatical period whose two parts are identical in meaning. Thus in saying "All being exists," we have a period dividing into nominative and verb; but the one means the same as the other, and therefore in putting them together, there is no resulting sense—no conclusion from the two, but only a repetition of the same thing under a different form. Again, in saying "As the tree enlarges, so does its size increase," we have a period dividing into two sentences rendered grammatically dependent by *as* and *so;* but the one sentence means exactly what the other means, and no sense results from their grammatical union. So likewise in saying "Home is home," we have a grammatical sentence dividing into *home*, the nominative, and *is home*, the verb; and if we understand no more from the latter, than from the former, the sentence says nothing: it is, in fact, an illogical, because an identical proposition; though rhetoric vindicates it, by implying under the verb a great deal more than it actually expresses. The following are other examples that neither logic nor rhetoric vindicates:

"The vain and empty glory of this world, is but nothingness."

Here the verbiage will be corrected, and the sentence become rational, by leaving out "vain and empty."

"Foolishly do the vain triflers we so often meet with in life, squander their useless hours in futile pursuits, while they neglect the needful duties which they ought to perform, and are guilty of continual faults which they ought to avoid."

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from *pride*, and *is odious*. Knowing what pride is, we know the feeling it produces in others; knowing what it is to be odious, we know what effects go along with the quality. In the deductive process, the alleging of reasons is nothing more or other than bringing forward prominently what thus lies behind the premises of our first proposition.

The verbiage of this example will appear by comparing it with the following correction:

"Many whom we meet with in life, neglect their duties, and squander their hours in futile pursuits."

"A good definition should include all the things to which the word defined is applied."

The verbiage lies in using *good* in constructing the nominative, along with *should* in constructing the verb. We ought to say, either—"A definition should include," &c., or—"A good definition includes," &c.

8. EXPLAINING A THING BY ITSELF. This form of *petitio principii* differs so little from the last, that it may scarcely seem to require a distinct designation. But as, when only a *verbal* explanation is meant, using another word having exactly the same signification is not a fault;* the learner may require to be reminded that this will be verbiage when the *thing* is to be explained; that is to say, the equivalent word will not explain the thing, but only be another word for it. It is, for instance, a fair verbal explanation of *Justice* to say that it is the quality of being *just;* but it is a cheat upon the understanding to deem that, by saying so, we have in any degree developed our knowledge of the thing. We should equally fail, though the fault might be more concealed, if, with an exactly equivalent meaning, we were to use a different word; if, for instance, we said, justice is the quality of being *equitable.* Hence, the following passage is a failure:

"Justice regards both magistrates and private individuals: the former show themselves to be influenced by it, when they make an *equitable* distribution of rewards and punishments; the latter, when they are sincere in their words, and *just* in their dealings."

Let *impartial* and *honest* be substituted for *equitable* and *just*, and the verbiage will be corrected.

9. REASONING IN A CIRCLE. This form of *petitio principii* takes place, when we go on proving one proposition by another, on the understood condition that the last, which is to establish the rest, will be self-evident: and then, instead of fulfilling the implied condition, we return to our first assertion, and use *that* for our proof, when it was the very

* See Chapter III. Section 5, page 134.

thing to be proved. Thus, it is obvious verbiage to say, "Pride is odious, because it offends our self-love; and it offends our self-love, because it is odious." The fault is less obvious, but equally present in the following example:

"Wealth makes the mind uneasy; for it fills it full of care; of care for its increase; of care, lest it should diminish; of care to prevent one portion from being lost, while we are watching for another: *and that all these effects are engendered by the possession of wealth, is established by the fact, that wherever we find riches, we are sure to find uneasiness and disquietude also.*"

The latter part of this example, so far as it pretends to be an argument for what precedes, is verbiage.

* We proceed to a third example:

"The formal syllogism of Aristotle is the test of all valid reasoning, all reasoning being invalid which conforms not to its formulæ: *e. g.* 'All vegetables grow: an animal grows: therefore it is a vegetable.' 'All wise legislators suit their laws to the genius of their country: Solon did this: therefore he was a wise legislator.' Now both these [apparent] syllogisms, and all similar to them" (so the argument continues,) "refuse the test which Aristotelian logic provides, and both of them" (so the argument still continues,) "are instances of invalid reasoning."

When, in proceeding to answer the argument, it is asked, why the latter instance, as well as the former, is an instance of invalid reasoning, the answer given is this;

"That the latter as well as the former, refuses the test which the Aristotelian syllogism provides."

Here, it is clearly evident that the reasoner goes back to the proposition he had to prove, namely that "the formal syllogism of Aristotle is the test of all valid reasoning," in order to answer the question, why the reasoning is wrong in saying, "All wise legislators suit their laws to the genius of their country: Solon did this: therefore he was a wise legislator." That the reasoning here is confusedly expressed, we acknowledge; † but that it is wrong reasoning, can never be established by so palpable an argument in a circle as the

* See the second foot-note, page 180.

† The true character of the fault with which this latter of the two examples is chargeable, will be assigned in the next Section.

instance supplies. And yet it is one of the modes of proof pursued in favour of Aristotelian logic, in the most popular logical treatise of the day.

10. IRRELEVANT PREMISES. Premises are irrelevant when what is said to follow from them, does not follow; as, "Every horse is an animal; sheep are not horses; therefore they are not animals." It is a designation by which we may distinguish one of the modes of the general fault called a non-sequitur, namely, that in which the premises are quite void of consequence.

*If our theory of deductive logic is true, a *non-sequitur* in thought is impossible. In the induction of knowledge, that is, in gathering it into the mind, we may indeed make the most unwarrantable assumptions, and the most fatal mistakes, and in developing our knowledge these errors will re-appear; but they will appear as premises, with no possibility (if we do not give up thought for words) with no possibility of flaw in the validity of our conclusions: inasmuch as every conclusion from premises, is but the fact of developing our knowledge, real or assumed, and of understanding our premises; and with relation to its actual premises, a conclusion cannot but be what it is. We can no more choose in the case, than we can choose in the case of sensation;—than we can choose, for instance, what our sensation shall be, when certain food is offered to the palate, or a certain shape to the eye. Let us know what *red*, and also what *earth* is, and the moment these are embraced as premises by the understanding, is the moment of our being aware of the meaning which, as one expression, they signify; and this is the conclusion from those premises; which conclusion, if the premises are not mistaken, cannot be other than it is. In like manner, let us know that *men are mortal*, and that *kings are men*, and the moment the understanding embraces these as premises, is the moment of our being aware of the conclusion, that *kings are mortal;* a conclusion which, with regard to the actual premises, cannot be avoided, and cannot but be what it is.

A false conclusion, then, with relation to its actual premises, being impossible, we have to ask how there can be such a thing as a false conclusion at all:—and the answer is,

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* See the second foot-note, page 180.

that, in the deductive process, there can indeed be no such thing, except when words are made to take the place of thought. Let us know what *square* means, and what a *circle* means, and it will be impossible for the understanding to embrace these as premises, and receive the grammatical combination as a conclusion :—nevertheless, the grammatical combination, *a square circle*, may be offered as a conclusion, and may be by him accepted who takes words for thought. In like manner, let us know what vegetables are, and what animals are, and it will be impossible—though our knowledge includes the fact that they both grow—it will be impossible for the understanding to embrace these as premises, so as to receive, as a conclusion, that an animal is a vegetable. Yet this again may be offered as a conclusion, and may again be by him accepted, who reasons not *by means* of words, but imitates that process by operating *with* words, and failing in the operation, which it is not difficult to do, reaches *that*, which in the true process of reasoning, is an impossible result. Now if the shrewdest of the present, or any other generation, were to employ his wits in devising an instrument by which, in failing to use it according to rule, it should be possible to come to conclusions of the kind here exemplified, he would not be likely to contrive anything so extremely ingenious as the instrument which has been in existence, and partially in use for some two thousand years,—the syllogism of Aristotle, with its apparatus of extremes and middle term. For this instrument, as its advocates declare, proposes rules of reasoning, " which have nothing to do with the truth or falsity of premises, but merely teach us to decide, not whether the premises are fairly laid down, but whether the conclusion fairly follows from the premises." * If the theory of our logic is true, this is something more preposterous than providing spectacles for them who cannot but see clearly, or crutches for them who cannot but walk well. Let us, however, take the instrument as it is put into our hands; and, acknowledging that it guards the reasoner against a wrong use of its forms,—acknowledging this, we say that in using it, we are rendered liable to traps and snares, which would not come in our way, if we reasoned without it. " The

* Whately's Logic: Province of Reasoning, Chap. i. § 1, ad finem.

conclusiveness of an argument," say its advocates, "is" (by this instrument) "made manifest by the mere force" (form) "of the expression, i. e. *without considering the meaning of the terms.*"* Admitted:—but when the reasoner has dismissed all attention to the meaning, there is at least a possibility that he should fail to employ the exact form, and employ one which seems a legitimate syllogism, but is not one: "All vegetables grow: an animal grows: therefore it is a vegetable." The apparent conclusion is of course a *non-sequitur* both in Aristotle's logic and in ours:—in Aristotle's, with reference to its defect in *form*, the fault is specially described as an *illicit process of the major*, or non-distribution of the major term in the premises:—in ours, we call it *irrelevant premises*, that is premises that cannot be embraced by the understanding—cannot be correctly understood—so that the last proposition is inevitable in the act of understanding them. And the practical difference we insist on, is this,—that in using Aristotle's instrument, there may occur the failure which produces the apparent conclusion:—in using language for the purpose of reasoning as our theory requires, the failure cannot, *in the shape exemplified*, occur.

Before we conclude the present section with a few examples to the same purpose as the foregoing, we must vindicate from the charge of *irrelevant premises*, though we cannot from that of *illicit process*, an example associated in Section 9 above, with a foregoing example, in which an animal is made a vegetable. That other example was, "All wise legislators suit their laws to the genius of their country: Solon did this: therefore he was a wise legislator." According to our logic, this is correct though *confused* reasoning; and as an example of confused reasoning, it will again occur in a subsequent section. It is correct, because the argument with its conclusion, "Solon suited his laws to the genius of his country, and therefore was a wise legislator," implies, by its being put forward as an argument for that conclusion, the datum which really exists in the understanding of the reasoner, namely that "All are wise legislators who suit their laws," &c. The confusion lies in his previously saying *other than he means;* which

* Whately's Logic: Synthetical Compendium, Book (or Chap.) II., Chap. (or Part) iii., § 1, ad finem.

confusion is removed by removing the irrelevant proposition, when what remains will be the premises, namely datum and argument, compendiously expressed: or the irrelevant proposition may be changed so that it shall accurately correspond to the datum in his mind.

Of examples of *irrelevant premises*, the snares and traps into which we are liable to run through an incautious trust in Aristotelian forms, and a non-observance of their rules, the following are appended as further specimens.

"If the hour-hand of a clock be any distance, say a foot, before the minute-hand, the last, though moving twelve times faster, can never overtake the other. For while the minute-hand is moving over those twelve inches, the hour-hand will have moved over one inch; so that they will then be an inch apart; and while the minute-hand is moving over that one inch, the hour-hand will have moved over $\frac{1}{12}$ of an inch; so that it will still be a-head: and again, while the minute-hand is passing over the space of $\frac{1}{12}$ inch, which now divides them, the hour-hand will pass over $\frac{1}{144}$ inch; so that it will still be a-head, though the distance between the two is diminished; &c. &c. &c.; and thus it is plain we may go on for ever. Therefore, the minute-hand can never overtake the hour-hand."

This example, which brings us to a conclusion contradictory to our clearest experience, is liable to be startling to a person who has any reliance on the mere forms of reasoning, more especially if he is acquainted with the truth, that, in mathematics, there are lines under certain conditions, which, though they are always approaching, can never meet. But this, which in certain cases can be true of abstract lines, that is lines unlimited by place, time, or dimensions, cannot, of course, be true in physics. How, then, is the *appearance* of truth given to the foregoing form of reasoning? By relying on the *form*, so as to keep the true *datum* or knowledge out of sight; namely, that "the hour-hand can never overtake the minute-hand *within the space at which they are at any time asunder*, but that this space will continually diminish till at last there shall be no space between them." It is now evident that no argument can be joined with this datum, which shall not be irrelevant to that which is appended as a conclusion,—namely,—"Therefore the minute-hand can *never* overtake the hour-hand."

"None but whites were civilized; the ancient Germans were whites; therefore they were civilized."

"None but whites are civilized; the Hindoos are not whites; therefore they are not civilized."

"None but civilized people were whites; the Greeks were whites; therefore they were civilized."

These are traps intended for the non-Aristotelian reasoner, who, in trying to grasp the knowledge held out in the premises, is beset by difficulties which the Aristotelian does not concern himself with; difficulties arising from the nature of the subjects, inasmuch as white men and dark men, civilized men and uncivilized men, are not separated in point of fact by any determinate line, but run into each other. *Our* reasoner will hence be inclined to deem each example inconclusive; and when the Aristotelian desires him to take the premises in each for granted, and then to distinguish the faulty example, he will find no one faulty beyond some confusion of expression; inasmuch as, in each instance, the argument (the second proposition) involves the *datum* required, in the very act of being put forward to reach the appended conclusion. Thus the *datum* which he understands in the first example, is, "All whites were civilized;" nor is it of moment to him, (except from the confusion it creates,) that the first proposition is irrelevant *as there expressed*, since the second and third contain, to his understanding, the premises he is called upon to admit. The Aristotelian, indeed, exclaims "Non-sequitur—undistributed middle;" but what is this to him who reasons, not *with* words, but only by *means* of words? or what admission has been drawn from him, which is likely to mislead his understanding in the future course of the reasoning?

"Light food is good for me: (i. e. food light of digestion.)
But this food is light: (i. e. light in specific weight.)
Therefore, it is good for me."

"Projectors are unfit to be trusted: (i. e. people who are always projecting.)
But this man is a projector: (i. e. a man who has brought forward a project.)
Therefore, he is unfit to be trusted."

"What is bought in the market is eaten: (of course, after being cooked, if necessary)
But raw meat is bought in the market:
Therefore, raw meat is eaten."

"All the angles of a triangle are equal to two right angles: (i. e. all taken together.)
This is the angle of a triangle: (i. e. one of the angles.)
Therefore, it is equal to two right angles."

"Five is one number:
Three and two are five: (i. e. they make up when joined.)
Therefore, three and two are one number."

These are traps for the Aristotelian reasoner, and not for ours. It is true, the latter may, in the induction of his knowledge, have been led, in such a case as the first, to bring under one term things in their nature different, and hence, because his premises were wrong, to deduce, in thought and practice, a wrong conclusion;—to deem, for instance, as indicated by the example in view, that food which weighs light in proportion to its quantity, is on this account light of digestion. But being taught to look to the subject-matter of his premises as the only source of invalidity in his conclusions, he is surely less likely than a reasoner not so taught, to rest satisfied with his deductions. The other examples can scarcely deceive him for a moment: to his understanding, the premises in all will at once appear irrelevant to their respective conclusions; nor can they, in fact, deceive any one but a reasoner who gives up all attention to the subject-matter of his argument, and trusts entirely to its form. Indeed we may fairly ask of the Aristotelian reasoner, why, on *his* principles, these forms of argument are not received? To say that we must not here rely on the forms, but go back to the meaning of the terms, is to confess, after all, that the subject-matter is everything, and the forms nothing. Hence, it is matter of complaint with Dr. Whately, that when Aristotelian teachers come to fallacies thus protected, as it were, by the very form of the syllogism, they have recourse, in order to expose them, "to a loose, vague, and popular kind of language;"* which may be translated to mean, that they now employ, for the first time, the language of common sense, in order to reach the common human understanding. Dr. Whately would have them more cautious, reminding them of the shelter of technical language, by which the esoterical disciple may still be kept aloof from the common

* Whately's Logic: Book (or Chap.) III. of Fallacies: Introd.

herd; as, for instance, by denominating the errors in the foregoing examples, *ambiguous middle; confusion of different intentions; fallacium a dicto secundum quid ad dictum simpliciter*, &c. Will an age so advanced as the present, tolerate much longer this learned trifling?

11. PROVING TOO LITTLE.—This must be a non-sequitur; a physical or real one, the facts of the case not reaching what we seek to establish; as when we say, "Our friend John never cheats or steals; and therefore he is a man of *every* virtue." The words *and therefore* are verbiage: what follows them may be true, but not true as a consequence of what precedes. The same fault, a little more concealed, is exemplified in the following:

"No man can be happy who pursues nothing but pleasure. For to procure what the world calls pleasure, requires money, health, and spirits; but most men who always pursue pleasure, will be always wanting some of these."

Nothing more is here proved, admitting what is averred, than that *most* men who pursue pleasure cannot be happy. The full proof would not be difficult by a wider induction of particulars; and it is only necessary to remind the young logician, that when he intends to establish a truth, he should bring forward all the facts, which may force a reasonable mind to admit it. He might, for instance, aver, as to the proposition in view, that, "the constant pursuit of what the world calls pleasure, unwarranted as it is by reason and conscience, will *ever* be found to harass the spirits, undermine the health, produce languor and satiety, and, at last, instead of real enjoyment, leave nothing to the feelings but disgust and pain."

Returning to the uncorrected examples, it may be observed, that in all cases of *proving too little*, we supply, mentally, an unwarranted datum; and we prove too little, because that datum must be proved before our conclusion will hold. Thus, in the first example above, the implied datum is, "He who never cheats or steals, is a man of every virtue." Grant this, and the conclusion is undeniable: but it cannot be granted, and hence the defect of having proved too little. It is indeed the error of our lives to take the *data* which our wishes, our passions, our prejudices suggest, before we have accumulated knowledge on adequate grounds. But the error,

be it observed, is always in the inductive process. In this process, the conclusion, which is properly and strictly called an *inference*, never follows *necessarily* from the premises, because it is never included in them, but is more or less probable up to the highest degree of certainty which our knowledge can reach; a certainty different *in kind* from necessary certainty, though it is the certainty from which flow all our necessary conclusions in the deductive process. Let us take the following instance: "This stone, which I have lifted from the ground, and let go, *has* fallen to the ground again: therefore, if I lift it again, and again let it go, it *will* again fall to the ground." The inference is not a *necessary* conclusion; but who, for a moment, doubts its certainty? That on which its certainty rests, is the wide, universal induction of particular facts, which, never having failed, the habit of our understandings leads us to accept as what never will fail.* In the deductive process, then, the datum which the foregoing inference supplies, has the utmost possible degree of strength,—namely, that "Every stone lifted from the ground and let go, having fallen to the ground, every stone that shall be lifted and let go, will fall." Very different in degree of certainty, are the data supplied by innumerable inferences, which we incautiously accept in the accumulation of our knowledge! Let us take a few by way of specimen:

"I am sure the man is a rogue, he has such an evil-looking face:" (i. e. He has an evil-looking face; *therefore* he is a rogue.)

"I have often observed that when it rains on Friday it also rains on Sunday: now yesterday was Friday, and it rained hard: *therefore* I am sure it will rain to-morrow."

"I got well while I was taking this drug: *therefore* it cured me."

"I have never begun anything on a Friday without being unlucky: *therefore* it is unlucky for any one to begin anything on a Friday."

"Everybody suspects John of having taken my purse: *therefore* he stole it."

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* See, on this subject, the explanation afforded by Mr. James Douglas of Cavers, quoted in the note to Section 15, Chapter IV., page 152.

"This dish which people praise so much, is, to my taste, very nasty: *therefore* it is unfit for anybody."

"Miss A., according to my idea, is very ugly, though I hear her beauty so much cried up: *therefore* she is very ugly."

"This food is extremely grateful and nutritious to the people living within the tropics: *therefore* it is fit food for all people."

In all the foregoing examples, after the prior shape of the first, the word *therefore* is so used as to be palpable verbiage, and thus the fault is in each made more manifest than it would be, if couched in more common forms of speech. But the more it is concealed, the more cause has the young logician to be on his guard. He must remember that whenever he reaches an inference by too narrow an induction, his conclusion in the development of his knowledge, necessary as it will be from the datum he *assumes*, must at the same time be without value; for he will always, in such a case, *prove too little*. The conclusion he reaches will not be a logical, or, in other words, a metaphysical non-sequitur, but it will be a physical or real one.

12. PROVING TOO MUCH.—This will also be a real non-sequitur; because if our proof includes more than *can* be true, that which *may* be true will not follow from it. It may be true that the drug which John took when he was ill cured him; but when, in order to establish this presumed truth, we aver that the illness of Samuel, and that of Thomas, and that of William, were cured by the same drug, the several diseases being distinct and in some degree opposite in character, so that the same drug could not have had the same effect on all, we prove too much, and the proposition, "*Because* John took the drug, he got well," remains unproved by it. Hence the connecting word *because* is verbiage, and to correct the example, we must leave it out, and put *and* between the sentences.—The same fault of proving too much occurs in the following example:

"No one can live a happy life who pursues nothing but pleasure. For it is in the nature of things that when a man gives himself up to one pursuit, it becomes tiresome. Therefore, people who are always following pleasure, do not take delight in it, but pass a troubled, uneasy, dissatisfied life."

If it were generally true, as here said, that when a man gives himself up to one pursuit, it becomes tiresome, then would it be true that in giving himself up to the pursuit of wisdom, knowledge, virtue, or other excellent thing, the pursuit would grow tiresome; a conclusion which we know to be false. It is true only of pleasure, that when pursued to the exclusion of other occupations, it no longer produces the effect desired from it, but becomes disgust and pain.

In these last examples, as well as in those of the previous section, we supply, mentally, an unwarranted datum. The difference is, that, in the former cases, the induction on which we *assume* each datum, is too narrow, that is, it has not collected a sufficient number of facts to warrant the datum; while in the latter case it is too wide, that is, it has included more facts than there was just ground for. An example of the latter occurred in the last section but one; in which a reasoner is supposed, in the induction of his knowledge, to have included under the word *light*, things of a very different nature, so as to persuade himself that all light food is good for him. The argument proves too much; for it includes all food specifically light. Further experience may correct the error; and then he will be aware why his former conclusion was wrong, namely, that the argument included in the word *light*, proved too much, and therefore, for his true instruction and benefit, proved nothing.—A few more examples of the same kind, may be sufficient to show how liable we are to these conclusions which flow from *proving too much.*

"Liberty is a blessing to man;" (without limiting the circumstances that make it a blessing;) "*therefore*, let us impose no laws on these uninstructed men, but allow them to do whatever they wish."

"Pleasure is a good which I eagerly desire;" (without discriminating between pleasure which is enduring, and pleasure which must turn to evil;) "*therefore*, I will plunge into the sensual revelry which invites me on every side."

"Wealth procures great advantages;" (without discriminating advantages, which, by itself, it cannot procure;) "*therefore*, I will accumulate wealth in every way, and at all hazards."

"Rank and power are highly desirable;" (without discri-

minating the circumstances that make them so;) "*therefore*, I will scruple no means to raise myself to rank and power."

"To make others fear to injure me, is judicious;" (without regard to the fact that fear may keep all at a distance who would otherwise befriend me;) "*therefore*, I will never allow the least injury, or even the least slight, to remain unrevenged."

"A. B. is our representative in parliament;" (without adverting to the variety of opinion in those he represents, and the understood condition, that he who is a member of *parliament*, ought to consult the interests of the nation at large, as well as of his constituency;) "*therefore*, A. B. is, on this question, bound to vote as we, namely C. D. and E., direct him."

The conclusion which the reasoner attains in all these instances, though, by granting him in each the implied datum, it is logically (metaphysically) correct, is nevertheless really (physically) false; in other words, a *real* non-sequitur.

13. DISTINCTION WITHOUT A DIFFERENCE.—We now reach another of the general forms of verbiage, namely, *Error in distinction or division*, of which, one of the species is that named above. It may be sufficient to warn the learner against the fault above-named, by the following examples:

"I propose to consider, first, the evils which arise from procrastination; and then, the miseries we should avoid by performing our duties at their proper time and place."

The reasoner is guilty of verbiage in this distinction; or, if he really means different things, he must mean "first, the *evils* of procrastination; and then, the *benefits* of performing," &c.—The following are two other examples:

"Books are the receptacles of knowledge, and the depositories in which the collected wisdom of ages is treasured up."

"Docility is a readiness to receive instruction, and a willing obedience to those who teach."

In both these instances, the word *and* converts what follows into verbiage: leave it out, and the verbiage is corrected. We shall, it is true, then have, in each example, two expressions to the same purpose; but these will be used as two nouns are used in apposition, the one to make the meaning of the other better understood, without pretending to add any-

thing new to the meaning.—And, as adding what is no addition, always amounts to a distinction without a difference, so likewise does disjoining what is not distinct; as,

"To be neither merciful nor compassionate, is unsuitable to the condition of man."

Here, to avoid verbiage, we must say, "Not to be merciful—not to be compassionate, is unsuitable," &c.:—or, avoiding the repetition, "Not to be compassionate is unsuitable," &c.

In rhetoric, the earnestness of a speaker to make the most of a point, frequently produces a redundancy of words when nothing is added to the meaning .But in logic, such a redundancy is a fault, and, if very palpable, will not answer the purpose even of the rhetorician. The following sentences * are therefore faulty.

"This great politician desisted from, and renounced his designs, when he found them impracticable."

"He was of so high and independent a spirit, that he abhorred and detested being in debt."

"Though raised to an exalted station, he was a pattern of piety, virtue, and religion."

"His end soon approached; and he died with great courage and fortitude."

"He was a man of so much pride and vanity, that he despised the sentiments of others."

"Poverty induces and cherishes dependence; and dependence increases and strengthens corruption."

"This man, on all occasions, treated his inferiors with great haughtiness and disdain."

"There can be no regularity or order in the life and conduct of that man, who does not give and allot a due share of his time to retirement and reflection."

"Such equivocal and ambiguous expressions, mark a formed intention to deceive and abuse us."

"His cheerful, happy temper, remote from discontent, keeps up a kind of daylight in his mind, excludes every gloomy prospect, and fills it with a steady and perpetual serenity."

14. CONFUSION OF CROSS DIVISIONS.—A cross division is a division for some purpose, or on some principle, distinct from

* Taken from Murray's Exercises: a key for correcting the instances will be found in the Appendix.

another division. Thus, a bookbinder divides books into folio, quarto, octavo, duodecimo, &c.: a philosopher into poetical, historical, &c.: a philologist into Greek, Latin, English, French, &c. Now a logician would be guilty of a great error, if he were to confuse these several divisions by dividing books, in general, into the several species of poetical, historical, folio, quarto, Greek, Latin, &c.; for these are not divisions under one general head which includes them, but divisions under particular heads for special purposes. Suppose, therefore, that in a theme on History the writer should set out with a division into Sacred, Profane, Ancient, and Modern, he at once plunges into verbiage; because sacred history is not distinct from ancient, but happens to be included in it; and because profane history is not distinct from modern, but happens to include it. The divisions are nevertheless just, if he does not confuse the one set with the other. —We run into the same fault when we say,

"The human body is divided into the head, trunk, limbs, and vitals."

For the vitals are included in the head, or trunk, or both; and the division should be into "head, trunk, and limbs;" so that the vitals, if spoken of at all, may be taken in subordination to what includes them.

The following are other instances * in which the fault is sufficiently apparent:

"The things brought out to me were some square, some white, some artificial, some round, some blue, some natural, and some red."

"He was a man of great temperance and high birth, very generous, and quick to discover fraud, of extensive riches and exalted virtue."

"In treating of Poetry, I shall consider it under the heads of Epic, Classical, Ancient, English, Lyric, Written-in-Rhyme, Modern, Dramatic, and Written-in-blank-Verse."

"Men, as to constitution, temper, and habits, are either phlegmatic, gay, devoted to business, sanguine, gloomy, devoted to pleasure, or choleric."

Errors in detail which come under the general head of Confused Reasoning.

15. Saying other than is meant. The faults now to

* A key for correcting them will be found in the Appendix.

be noticed are faults of expression; being faults of reasoning only so far as faulty expression can scarcely fail to cloud and confuse the reasoning. We assume Logic to be the art of developing knowledge for our own security and satisfaction; but always with a view of applying our skill, ultimately, to the purposes of rhetoric, that is of informing, convincing, and persuading others. Now if we say other than we mean, although what we mean may, in some sort, be present to our own understanding, and although others may not altogether mistake what we mean; yet there will, on both sides, be a degree of confusion, which it is among the objects of logic to prevent. The following examples, therefore, though faulty only in expression, are properly deemed illogical.

"Ambition is so insatiable, that it will make any sacrifice to attain its objects."

"As to be content with what we have, is to be truly rich, it follows that no covetous man is truly rich."

"Solon was a wise legislator; for all wise legislators suit their laws to the genius of their nation."

Each of these examples exhibits a *non-sequitur* in expression; but it is in expression only. The meaning which the reasoner designs to convey, and that which, in spite of the faulty expression, the hearer or reader receives, is the following: "Ambition is so insatiable, that, however much it gets, it will still desire more, and make any sacrifice to attain it." "As no one is truly rich but he who is content, it follows that no covetous man is truly rich." "Solon was a wise legislator; for all are wise legislators who suit their laws to the genius of their nation."—The expression in each example may be made correct in another way, namely by foregoing the logical connection understood between the facts, and stating them as things that only happen to come together; as "Ambition is insatiable: it will make any sacrifice to attain its objects." "To be content with what we have, is to be truly rich: no covetous man is truly rich." "Solon was a wise legislator: he and all other wise legislators suit their laws to the genius of their nation." This way of correcting a non-sequitur is left to our choice in cases like these, when the fault was only in the expression, and not in point of fact: but we have no choice—we must take the latter mode, when the non-sequitur is of the latter kind; as "All vegetables grow; an animal

grows:"—we cannot connect these by any logical consequence; they must be left in their independent state, or joined in expression as we usually join things that happen to come together; for example, "All vegetables grow, and so does an animal." Again in proposing to join *round* and *square*, we find them irrelevant to any conclusion,—in other words they will not make sense, and therefore instead of saying *a round square*, we must leave them independent of each other's meaning, and say *a round, and a square.*—Returning now to examples in which the non-sequitur is only in the expression, we may indicate to the learner, as specimens in point, all those which were furnished in the Manual of Grammar (pages 92, 93,) to discriminate between grammar and logic. Thus, "He that was dead, sat up:"—Each being taken strictly, the two members of this sentence cannot unite and imply one sense: but the former member is neither meant nor received according to its strict import; and therefore it does unite with what follows. The same thing might be shown of all the other examples at the pages referred to; yet they all come under the censure of confused reasoning, (except one or two vindicated by rhetoric,) because in all of them the reasoner *says other than he means.*

It must be further borne in mind, that not only should an expression convey none other than is meant, but should likewise be free from a double meaning, though one of the meanings may be the one intended. Sometimes, as in the case of pretended prophecy, there may be a purpose in equivocation; but with such a purpose, logic is not concerned; and in correcting a few more examples* continued from the Manual of Grammar, the student will take care that each sentence shall convey one, and only one meaning.

"Pyrrhus the Romans shall I say subdue."

"The duke yet lives that Henry shall depose."

"The rising tomb a lofty column bore."

"And thus the son the fervent sire addressed."

"And all the air a solemn stillness holds."

"He was mounted upon a hot and fiery steed, which his aspiring rider seemed to know."

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* Some of them are from Murray's Exercises: a key for the correction of each, is furnished in the Appendix.

"If this day happen to be Sunday, this form of prayer shall be used, and the fast day kept the next day following."

"A collection is making to protect and uphold such electors as refused, contrary to their desires and consciences, to vote for A. and B. regardless of threats, and unmindful of intimidation."

"He was more than commonly civil to me."

"You can only arrive in time by starting early."

"Though he had been charitable to others, he found but a few friends in his own extremity."

"Persons not having an income amounting to a hundred and fifty pounds a year, are not liable to the income-tax."

"The Romans understood liberty at least as well as we."

"Theism can only be opposed to Polytheism or Atheism."

"These are not such designs as any man, who is born a Briton, in any circumstances, in any situation, ought to be ashamed or afraid to avow."

"The eagle killed the hen, and eat her in her own nest."

"It has been said that not only Jesuits can equivocate."

"You will not think that these people, when injured, have the least right to our protection."

"Solomon, the son of David, who built the temple of Jerusalem, was the richest monarch that reigned over the Jewish people."

"Solomon, the son of David, who was persecuted by Saul, was the richest monarch of the Jews."

"Lisias promised his father, never to abandon his friends."

"The Divine Being heapeth favour on his servants, ever liberal and faithful."

"Every well-instructed scribe is like a housekeeper, who bringeth out of his treasure things new and old."

"Dryden makes a very handsome observation, on Ovid's writing a letter from Dido to Eneas, in these words."

"Imprudent associations disqualify us for the instruction or reproof of others."

16. NOT DISTINGUISHING DIFFERENT SENSES OF THE SAME WORD. This fault is the opposite of one which was ranged under the general head of Verbiage; namely, a distinction without a difference. Our present title might be, a difference without a distinction; but it will be better to limit our examples to those which exhibit the fault in the particular way

described above, namely, by not distinguishing different senses of the same word. Be it observed, however, that we are concerned with this fault, only so far as it *confuses* the reasoning, and not with that effect which was the subject of a previous section, where it is shown that the reasoner, in the induction of his knowledge, is led to include under the same word, as things of the same nature, those that are essentially distinct; and hence, though he reasons rightly in the deductive process, to come to a wrong conclusion, because his previous knowledge is wrong. (See Sect. 12, at page 201, where the word *light* is alluded to.) In the following, and other similar examples, the reasoning, independent of the words, is correct; but the expression makes it confused:—

"To write well is an accomplishment of the first importance, because we form an immediate judgement of a person's education from the manner in which he writes. If we receive from any one a letter scarcely legible, scrawled rather than written, we hardly think well of the writer's education, though perhaps the sentiments may be tolerably expressed. But if the language is ungrammatical, and all the sentences confused; in short, if there appears a total deficiency of skill in the art of writing, we immediately conclude that the person is altogether ignorant and illiterate."

Here *bad writing* in the sense of *bad manuscript*, and in the different sense of *bad composition*, are confounded. The intended reasoning is made clearer thus: "To write a fair hand is an accomplishment of much importance, because we often form an immediate judgement of a person's other acquirements from the hand he writes. But it is of much more importance to obtain a correct and graceful style of expression. The one is a manual, the other, a mental art. If we receive from any one a letter scarcely legible, scrawled rather than written, we hardly think well of the writer's education. But if the language is ungrammatical, and all the sentences confused; in short, if there appears a total deficiency of skill in the art of composition, we," &c.

The following is another example:

"It is better to be sensible than witty. A witty man may raise admiration, but he seldom gains love. A sensible man, though perhaps not much listened to at first, gains constantly increasing attention, till, at last, he is consulted by all,

and loved by all. To be sure it may be a disadvantage to be too sensible; for instance, to be too sensible to reproach, or ingratitude, or neglect. But the very quality of being sensible will enable the person to surmount this failing, and render him superior to the injustice of the world."

Here, there is confusion between *sensible in understanding*, and *sensibility on account of what others do or say*. Correct part of the example thus: "To be sure, a sensible person is liable, like others, to incur unmerited reproach, ingratitude, or neglect. But the quality of being sensible, will enable him to see such dispositions in their true light, and render," &c.

A third example may be added:

"My friend Brown was the strongest man I ever knew, and yet sometimes the most timorous. In body and limb, he was so nervous, that he could overcome, in wrestling, men who were twice his weight; and yet, if he had to pass through a church-yard at night, his nervousness was such, that he would shake all over. So we see that the strongest frame does not protect a man from superstitious fears."

The confusion here is between *strong in bodily nerve*, and *liable to fears which affect the nerves*. Instead of saying "his nervousness was such," say, "his timorousness was such," and the example will be corrected.

17. NEGLECTING THE MEANS OF DISTINCTION AND DIVISION WHICH GRAMMAR PROVIDES FOR THE CLEAR DEVELOPMENT OF THOUGHT BY WORDS.

The means which grammar provides, are sentences periodic and non-periodic; paragraphs, otherwise called sections; and parts made up of paragraphs or sections. All that grammar looks to in these, is the accuracy of the outward structure. It is for logic to take care that the structure has its foundation in the purposed development of thought, so that there shall be union where that purpose requires union, and distinctness, where it requires distinction. *We must not overload a sentence, or paragraph, or higher division of discourse, with what cannot be readily apprehended as a part of its purpose.* Hence the young theme-writer fails in the examples given hereunder:—

Example 1. "Courage leads us to face danger without fear; fortitude, to bear calamity without complaining, and is a virtue all ought to possess; for being, as we all are, born to trouble, afflictions of some kind must fall to our lot."

The proper business of the former part of this sentence appears to be, if clearly settled in the writer's intention, to define fortitude in contradistinction to courage; and that purpose being completed, the sentence should have ended, namely, at the word *complaining*. What follows should be not only in a different sentence, but should begin a new paragraph with the word *fortitude* repeated as nominative to the verb *is*. For it appears that the reasoner, having made his way clear by defining his subject, is about to consider its necessity, &c.

Example 2. "The high-born, the rich, and the beautiful, are peculiarly exposed to flattery; and the sweet incense is offered to them in abundance, by those whom all good men justly abhor for their deceitful servility."

In this sentence, the reasoner proposes to show the dangers arising from flattery which attend birth, wealth, and beauty, and also to show the baseness of flatterers. These purposes should be enunciated distinctly; they should not be attempted even in the same paragraph. Let us say that the first paragraph shall confine itself to the former object, and begin thus: —"The high-born, the rich, and the beautiful are peculiarly exposed to flattery. Their favours are eagerly sought by multitudes, and every stratagem is employed to attain them. The sweet incense is, therefore, offered in abundance, and is eagerly inhaled, till the victims intoxicated by the fumes;" &c. In this strain, or something like it, let us carry out the former of the two purposes. The development of thought being, as to this point, sufficiently extended, let the development as to the next point, have also its appropriate paragraph, beginning perhaps thus:—"But the flatterer is justly abhorred by all good men; for the art he uses is deceit and servility. To gain his own ends, he wears a constant mask, and belies the real sentiments of his breast. He offers what he knows must poison the mind; a worse effect than," &c.

Example 3. "We may therefore come to these conclusions, —that perfect bliss is not to be found in this life; that our felicity consists in the pursuit, much more than in the attainment of our wishes; and that happiness without alloy is reserved for another state of being: *as the most fortunate of men, when they have reached all they once desired, are still in want of something to complete their happiness.*"

If the reasoner had previously stated arguments sufficient

to infer the conclusions, the after-thought in italics is out of place. It is either superfluous; or it ought to have been brought forward among the previous arguments.

*It belongs to rhetoric to bring forward arguments in such order, and with such outward admonitions of order, as may best fit them for reception, and clear understanding, as regards the persons addressed. In logic, *that* is the best order, which the reasoner finds most effectual for the clear development of his *own* knowledge to *himself*. What this may be, depends upon his habits of thinking. Some order he must have, or the development of his knowledge will be confused and valueless. He must fix points for development; and each of these being pursued to a satisfactory extent, he must then bring them all to issue in some one general result, which, during the progress of each, he has kept steadily in view. A reasoner whose exercises in logic are thus conducted, will, when he is required to be a rhetorician, find little difficulty in dividing an extensive discourse into parts subordinate and principal, whatever be the names he chooses to employ, sections, chapters, books, &c.; or other names, or external indications of division without formal names,—he may choose to employ. To interfere, by express directions, with this liberty of choice, would be, to curb originality in the conduct of thought; and to attempt to teach those who have no originality, would be, to show how fields may be divided, which produce no fruit worthy of division.—Our next general head, *Ignoratio elenchi*, will add something to the instruction which the present head proposed.

Errors in detail which come under the general head of Disjointed Reasoning.

18. Omitting necessary propositions. This is one of the forms of *ignoratio elenchi;* a phrase which may mean, having no proposition in view which the arguments in progress are intended to establish; or forgetting the proposition which has been laid down to be established. Both of these are the errors of a learner who has collected his knowledge by efforts of memory, and can perhaps clearly recover it in parts as his memory happens to serve him; but who has never

* See the second foot note, page 180.

meditated on his knowledge, so as to make it completely his own. Knowledge, in all cases, is the apprehension of relations; but these relations are separately innumerable; and many of them may, in their separate state, exist clearly in a mind of inferior power or industry. To collect them under higher and higher relations, is the effect of what we call *thinking;* a process which brings the separate relations under higher ones that include them. There are no limits to this process; and once begun, we may hope it will continue. All that can be proposed in a work of instruction like this, is to indicate the ordinary modes of failure, one of which is specified by the present title. An example is afforded by the following extract from a learner's theme, in which several propositions are required to make the train of thinking clear.

"The treasures of wisdom, like the precious ores, lie not on the surface to be picked up by the casual traveller, but must be sought for with pains and labour. Books and teachers may show how and where the treasure is to be sought, but it can be gained for us by none other than ourselves,—by our own perseverance, our own patient examination, our own frequent reflection. If the limbs were muffled up, they would soon lose their strength: and so the faculties of the mind, if not employed, and directed to the acquisition and arrangement of knowledge, will fail in their natural acuteness, and become incapable of any steady and useful effort. In solitude we may learn with what wisdom the Creator has fashioned even the least of his works:—in society we may observe characters and manners, and grow wise in the knowledge of mankind."

The correction of the example will show the importance of attending to the caution which heads the present section. (Title:) "On Study."—(First division or paragraph:) "*Knowledge cannot be obtained without study.* The treasures of wisdom, like the precious ores, lie not on the surface to be picked up by the casual traveller, but must be sought for with pains and labour. *And the labour must be our own: we cannot here enjoy the profit while others have the toil.* Books and teachers may show how and where the treasure is to be sought, but it can be gained for us by none other than ourselves,—by our own perseverance, our own patient examination, our own frequent reflection."—(Second paragraph:)

"*Let us further observe that study is as necessary to the mind as action is to the body.* If the limbs were muffled up, they would soon lose their strength: and so the faculties of the mind, if not employed, and directed to the acquisition and arrangement of knowledge, will fail in their natural acuteness, and become incapable of any steady and useful effort."—(Third paragraph:) "*Nor is it in books alone that we may find the means and opportunity of study.* In solitude we may learn with what wisdom the Creator has fashioned even the least of his works:—in society we may observe characters and manners, and grow wise in the knowledge of mankind."

It may be necessary to add, that the divisions or paragraphs require not to be named, if the manuscript distinguishes them in the usual way; and that italics are used above only to call attention to the propositions which are supplied.

19. PROPOSING TOO MUCH OR TOO LITTLE. A proposition ought not to contain more than the arguments are intended to prove; since, in the mind of the reasoner, it is, or ought to be, the conclusion from those arguments. Suppose, for instance, that the theme-writer intends, in one division of his exercise on Astronomy, to dwell upon the sublimity of its objects, he ought not, in that division, to say that "astronomy is a noble, an interesting, and a *useful* science," but only say that "it is sublime, noble, and interesting." Yet the omission of the word *useful*, would be a fault at the commencement of the theme, in proposing *all* the points which the reasoner intends to consider; since the *utility* of the science, it is presumed, would be one of the points.

A writer should be careful of even seeming to promise too much; and therefore, in a theme, all high sounding transitions or introductions should be avoided. Suppose, for instance, that the theme-writer, after dwelling on the sublimity of Astronomy, were to proceed thus:

"Having thus described and illustrated, to the best of my ability, the sublime thoughts, and correspondent emotions, to which the noble science of astronomy gives birth, I shall now proceed to show, that this branch of study is not less useful to man, than it is sublime and interesting."

This would be a transition of disproportionate length to suit a brief theme. The writer needs only say, "But the

study of astronomy is as useful as it is sublime;" and then proceed to show its uses.

20. DEVIATION FROM THE PROPOSITION. This fault occurs when the reasoner lays down a proposition, which he follows up by arguments that do not especially belong to it, but to some other proposition, which embraces both the first proposition, and the others. His reasoning, therefore, may not be wrong, if referred to something in his mind which he leaves unexpressed, but is irrelevant with regard to the proposition with which he starts: for example:

"Anger has been called a short madness; and people of the weakest understandings are most subject to it. It is remarkable that when a disputant is in the wrong, he tries to make up in violence, what he wants in argument. This arises from his pride. He will not own his error; and because he is determined not to be convicted of it, he falls into a passion."

There may be truth in all that is here said, but it is not truth to the purpose,—at least, if the commencing proposition is meant to indicate the purpose. To follow up that purpose, the reasoner should have proceeded in the following manner, or in some manner like the following:

"Anger has been called a short madness. To be convinced that the appellation is just, let us look to the effects of anger. It disturbs a man's judgement, so that he inflicts an injury on his dearest friend, whom, the next moment, he loads with caresses. It makes him run headlong into dangers, which, if his mind were clear, he would be the first to see and avoid. It is true that anger does not always disturb the mind to this degree; but that it disturbs the mind to a degree proportionate to its violence, is certain; and, therefore, it may be justly denominated a madness."

21. DISCOURSING SHORT OF THE PROPOSITION. This fault arises from regarding a subject in some partial point of view which happens to be familiar to the reasoner, instead of regarding it in the extent implied by the term or terms proposing it. Suppose, for instance, that *Education* is the subject proposed to be developed, and that the reasoner is a young female;—she would ill suit the arguments to so general a subject, although she would correctly proceed according to her limited experience, if she began thus:

"My opinion of education is this, that reading, writing, and arithmetic, are the groundwork, and that English grammar comes next in importance. A child ought to begin French very early, because the pronunciation of that language is difficult in maturer years. I would also recommend attention to the accomplishments of dancing, drawing, and music; and, above all, I would not have needle-work neglected."

It is evident that such a detail does not meet the subject in the universal sense in which it is proposed. But how can we expect, from a reasoner, the development of more knowledge than experience has provided? Yet it may be useful to point out, to such a reasoner, that if the subject is proposed in its widest sense, the arguments should be equally comprehensive: for instance:

"My opinion of education is this, that it is then only just, when it fits the individual for his duties. For this purpose, both the mind and the body stand in need of discipline. The mind must be made acquainted with the duties of life, and instructed in all science necessary to their performance; and the body must be formed to whatever habits will most effectually conduce to the same end."

All this is applicable, whether we speak of a male or a female, a prince or a peasant, a member of civilized society, or a savage who lives by hunting and fishing; and the arguments, as to their extent, therefore agree with the proposition. Yet a writer is not bound to treat a subject thus generally: he may choose a special view, because he feels competent to no other. All that is required, in such case, is a statement, at the beginning, of what he intends—a proposition which limits the general subject, and saves the arguments from the charge of irrelevancy. Thus, the female reasoner in the example furnished above, would have been free from censure, had she begun thus:

"Of education, generally, I am incompetent to speak. I can but point out, from the experience I have had, what I think necessary to be taught to young females, raised, in our country, above the necessity of manual labour. They must learn reading, writing, and arithmetic; and English grammar comes next in importance. A child ought," &c.

22. DISCOURSING WIDE OF THE PROPOSITION. This fault arises from an indistinct view of the subject. Hence the

writer, instead of using arguments which agree with the proposition, and with nothing else, employs such as agree with some general proposition under which the particular one is included: he may be compared to a person that shoots toward the mark, but does not take aim precisely at it.

Example 1. "Prudence is a sure road to reputation. They who are obedient to their parents and teachers when young, obtain accomplishments which are of the highest value in maturity. As they advance in years, they fear God, honour the king, and do as they would be done by. By this manner of conduct, they may sometimes miss immediate advantages, such as short-sighted, cunning people would snatch at; but they gain what is much better, the approbation of their own hearts, and, finally, the respect and applause of mankind."

These arguments do not belong to *prudence* in particular, but to *virtue* in general, and would accordingly be suitable to this proposition,—"Virtue is the surest road to reputation. They who are obedient," &c. Arguments suitable to the other proposition, will be such as these:

"Prudence is a sure road to reputation. A man whose abilities are of a common, or even of an inferior order, but who determines cautiously, and chooses the proper time for all he says and does, will advance with certainty, though perhaps slowly. The chief cause of his progress will be, the confidence he secures: for all feel the value of *his* advice, assistance, and agency, who knows exactly when to speak, and when to be silent, when to act, and when to cease from action."

Example 2. "Disappointments are a great part of our portion in this life. In our infancy we are liable to dreadful accidents, and must trust entirely to others for safety and preservation. As we grow older, we think we can take care of ourselves, and we become confident and presuming. But almost every day brings with it some greater or less misfortune, and thus we are gradually taught not to depend entirely upon ourselves, but to put our chief trust in God."

To keep to the point, the reasoner should have proceeded thus: "Disappointments are a great part of our portion in this life. The wishes and hopes even of our childhood are as frequently checked as gratified; but this may seem inevitable, because we have not yet acquired sufficient experience to

form proper expectations. As we grow older, we think our better judgement enables us to calculate less erroneously, and we become confident," &c.

An indistinct view of a subject is often betrayed by a single expression. Suppose the theme-writer is treating of *melancholy;*—in urging the duty of not giving way to it, he should not say, "We are bound to bear the evils of life with *patience*," but "with *cheerful resignation*." On the other hand, if he is treating of *fretfulness*, he ought to argue that we are bound to bear the afflictions of life with *patience*.

CHAPTER VI.

THE SYLLOGISM OF FORMAL LOGIC.

1. We deem some account of this syllogism to be expedient, not because it can be of the least practical value to our student, but because the technical language pertaining to it, has, from time immemorial, been associated with the prevailing notions of logic, and we would not have our student quite ignorant of what, through the force of habit, is wont to be thought necessary in a work upon Logic. And that the account given for this purpose may be clearly understood in contradistinction to the doctrine held in this Manual, we shall conclude the chapter with a recapitulation of the leading principles of our doctrine.

Some Account of the Syllogism of Formal Logic.

2. The Syllogism which is worked by *extremes* and *middle term*, is constructed under a persuasion that the act of the intellect by which, from two things known, we reach a third, is a voluntary act; and that, in the deduction of our knowledge, real or assumed, we can, with relation to this knowledge, come to wrong *conclusions*, as, in the induction of it, we can wrongly apply what we know, to interpret what we do not yet know,—in other words, can make wrong *inferences*. The persuasion is completely erroneous; but it is one into which we almost inevitably fall, if we embrace the ordinary or vulgar notion of the way in which language is the exponent of thought. The syllogism of Aristotle is built upon the common notion: let us then see what this notion is.

3. The vulgar notion of thought expressed by language, is, that the one represents the other with a perfect correspondence of part to part, and a correspondence of operations in joining the parts. Acting on this notion, we shall, when we desire to ascertain what exists or what is going on within the mind, examine what exists outwardly, and how we operate with what so exists. Proceeding upon this principle, altogether a false one, we shall, in the first place, arrive at *ideas*, as the presumed mental originals of single words, and at an appropriate faculty of the mind, by which these ideas, primarily received into the mind from the things of sense, are revived by words; which faculty is called *simple apprehension*. But words, without being formed into sentences, can be joined by certain grammatical particles; and we must again look into the mind for the correspondent originals. Hence the division of *apprehension* into *complex* and *incomplex*, the latter being the apprehension of ideas signified by single words, the former by words united so as not to be sentences. The next operation of language is the joining of words into sentences. This is done by verbs. But verbs are many, while the effect of a verb is always the same. We have therefore to find a verb, which shall produce this common effect, without embarrassing the outward operation with more than it produces. Such a verb is found in what is called the copula, *is*. This verb, placed between the signs of two ideas, is supposed to indicate another operation of the mind called *Judgement*; for, admitting that the one idea agrees with the other, the judgement pronounces that they do agree, and the verb *is* presents itself as the sign of that verdict. But they may not agree; and we have further to find, in the outward operation, a sign correspondent to the opposite determination of the judgement; which, if found, we are to take as an evidence of a correspondent mental act. The sign required is found in the grammatical term *not* or *no*.—Advancing now from words formed into sentences, to sentences formed into discourse, we have again to ascertain, from the outward act, the (presumed) correspondent mental operation. Why should propositions which the judgement pronounces to be true, because it has compared the ideas in each, and affirmed or denied that they agree,—why should these necessitate another proposition which is true because the others are true? This is the problem which the syllogism

undertakes to solve, and in taking up this problem, we enter upon a third operation of the mind, called *Reasoning*.

4. To solve this problem in the Aristotelian way, we must suppose that, in innumerable cases, the judgement is unable to pronounce, of two ideas, either that they agree or disagree. In this difficulty, the reason comes forward, and provides a third idea by which to measure these two. What really does take place in every act of the intellect, here comes in to give plausibility to the Aristotelian doctrine, namely, the occurrence of premises, which are always two, and the inevitable intellection from them.* But in the doctrine of the syllogism this is proposed to be accounted for, not as an inevitable, but a voluntary act. We have to prove that two ideas agree or disagree, when the judgement cannot pronounce that they do so; and, as above-said, reason is supposed to provide us with a third idea. With this idea each of the two ideas is measured, and if each idea agrees with the third, then Reason determines that they agree with each other; but if either of them disagrees with the third idea, then it determines that the two disagree. The mental process here described, if manifested with accurate correspondence outwardly, requires three propositions, two in which the ideas whose agreement or disagreement is sought to be proved, are severally measured with the idea signified by the middle term; and one in which, consequently upon the two-fold comparison, the two extremes, as they are called, receive from this reasoning process, the judgement of agreement or disagreement. It is, of course, admitted by the Aristotelians, that sentences united into dis-

* The doctrine of the Aristotelian syllogism has the effect of the juggler's art, who talks to his audience of something which he seems to be doing, yet is not doing, in order to call off their attention from his real proceeding: the difference is, that the ordinary juggler does not deceive himself, and the Aristotelian does. Dugald Stewart indeed intimates that the prime juggler knew what he was about; but this is hardly credible; and with regard to his followers, nothing can be more conscientious than their belief in the truth of what they teach: see, for instance, Dr. Whately, *passim*. The fact is, that they feel the true ground of the syllogism even while describing the false one. And so capital is the trick, that Locke and others, though they see it must be a trick, are not able to describe how it is done. Locke merely says, with characteristic simplicity and plain English sense, "God hath not been so sparing to men to make them barely two-legged creatures, and left it to Aristotle to make them rational. He hath been more bountiful to mankind than so."

course do not always appear in the forms of syllogism; but it is insisted upon, that *their* syllogism, namely, the syllogism which works by extremes and middle term, lies concealed under every operation of language transcending the representation of ideas by single terms,—the representation of ideas by terms joined by particles not being verbs,—and the junction of terms by means of a verb into a sentence; which last mentioned fact yields what they call a proposition in outward form, and a judgement when spoken of as the correspondent operation in the mind. But this is not the whole of the matter: The doctrine thus briefly described, carries with it much other doctrine, both in the preliminary stages, and in the syllogism which results from them. First, for ideas, we have the doctrine of the *Categories* or *Predicaments*, which are ten in number; *Substance*, *Quantity*, *Quality*, *Relation*, *Place*, *Time*, *Situation*, *Possession*, *Action*, *Suffering*. These are presumed to contain, as *summa genera*, all our ideas; in other words, all the subject-matter of judgement and predication. Passing to the next stage, that is to the operations of the Judgement upon these materials, we have a division into *subject* and *predicate*, the term expressing an idea concerning which a judgement is to take place being called *a subject*,—the term expressing the idea affirmed or denied to agree with it, being called *a predicate*. Hence, ideas and their correspondent terms, when they are to be predicated, are called *predicables;* and the doctrine is, that they can be predicated as *genus*, or as *species*, or as *difference*, or as a *property*, or as an *accident*. Thus *animal*, which belongs to the category substance, can be predicated as *genus* of the subject, man; (also belonging to the category, substance). Thus *rational*, belonging to the category quality, can also, as a *difference*, be predicated of the subject, man. Thus again *rational animal*, now again belonging to the category substance, can be predicated, as his *species*, of the subject, man,—the difference and the added genus making up the species. Thus, once more, *risibility*, which belongs to the category quality, can be predicated as a *property* of the subject, man. And thus, lastly, being *young* or *old*, *tall* or *short*, *rich* or *poor*, *digging in his garden*, or *asleep in his bed*, and so forth, can be predicated as an *accident* of the subject, man. Such doctrine under the first and second of the assumed three operations of the mind, fur-

nishes the ground for constructing the formal syllogism; by which, as already said, when the judgement cannot pronounce on the agreement or disagreement of two ideas, it is proposed to *demonstrate* their agreement through the instrumentality of a third idea. To a demonstration an axiom is necessary; and the axiom of the formal syllogism is the *dictum de omni et nullo;* whose purport is, that *whatever is affirmed or denied of all the members of a class, may be affirmed or denied of every member of it;*—where, be it observed, the word *all* is required to be understood distributively, and not collectively; so that a less equivocal statement of the axiom is this—*Whatever is affirmed or denied of every member of a class, is affirmed or denied of every member of it;* as pure an axiom, no doubt, as another often referred to, namely, *Whatever is, is.* In our logic, we call this an identical proposition, and consider it to be verbiage. But let us accept them both as axioms, and pass on to other doctrine necessary to the construction of the formal Syllogism. The terms expressing the ideas whose agreement or disagreement is to be demonstrated, are to be received under the names of *minor*, and of *major* term, the former being the subject, the other the predicate; as, for instance, in saying *Kings are mortal*, *Kings* is the minor, and *mortal* the major term. Then we have a difference of propositions with regard to their *quality*, and to their *quantity;* a proposition which *affirms* the agreement of the two ideas being said to differ in *quality* from one which *denies* their agreement; and a proposition which affirms or denies *universally* of a class of things, being said to differ in *quantity* (and this is, of course, a difference in *our* logic also,) from one which affirms or denies only concerning *some* of a class; for instance, it is one thing to say, "All your servants are rogues;" and another to say, "Some of them are rogues," or "Some one is a rogue." Another necessary doctrine towards the construction of the formal syllogism, is that of the *distribution* or *non-distribution* of terms. The purport of this may be indicated by an example. If we say that "Every mare is a horse," it does not follow that "Every horse is a mare:" but if we say that "No goose is a swan," it does follow that "No swan is a goose." Accordingly, it is one of the principles in the doctrine of the formal syllogism that the minor term of an affirmative proposition is *distributed*, that is, it in-

cludes all that it can be applied to; while the major term is *undistributed*, that is, it does not include all the things it can be applied to; as, for instance, in saying "Every mare is a horse," the term *horse* understood only of those horses that are mares, does not include all that the term *horse* can be applied to: but with regard to a negative proposition, both the major and the minor terms are distributed. And now with the apparatus of the syllogism, and its doctrine in hand, let us proceed with the demonstration it proposes. When we have to show, on the principles of the science, that two ideas agree or disagree, we must hunt among the categories for a suitable third or middle term, with which to compare, first the major, and then the minor term:—the proposition arising out of the comparison of the middle with the major term, is then called the *major premise*; and that arising out of the comparison of the middle with the minor term is called the *minor premise*. If, in these two acts of comparison, the *judgement* determines an agreement between the major term and the middle,—and again between the minor term and the middle,—then *reason* comes in, and affirms, in what is called the conclusion, the agreement which was to be demonstrated between the terms that have been thus measured with the middle term:—but if the *judgement* determines, in its two acts of comparison, that either the major or the minor term, does not agree with the middle term, then *reason* determines, in the conclusion, what, as an alternative, was to be demonstrated, namely, the disagreement of the terms that have been measured with the middle term; in other words, that the major of the conclusion must be predicated negatively of the minor. But the conclusion arrived at through this process, cannot, after all, be depended upon, except under the safeguard of laws growing out of the doctrine of the quality and quantity of propositions, and the distribution or non-distribution of terms. Thus, for instance, we are required to distribute the middle term once at least in the premises; a failure in which, is called an *undistributed middle*. Thus, also, we are required to distribute the major or the minor term in the premises, if we propose to distribute it in the conclusion; a failure in which, is called an *illicit process of the major* or *of the minor*:—either of which failures vitiates the demonstration. Prepared, in this manner, to distinguish between a legitimate and an illegitimate

syllogism, we come next to consider in how many ways three propositions can be constructed out of *extremes*, that is, out of the minor and major terms which are to form a conclusion when we reach it, and the *middle term* by which we propose to reach it. Now, disregarding the laws concerning the quality and quantity of propositions, which laws determine what forms are to be accepted as legitimate syllogisms, and what are not, we have no fewer than 256 of these triads of propositions, out of which, only 19, by virtue of the laws referred to, will be legitimate syllogisms; that is, syllogisms, which the dictum of Aristotle, referred to as their axiom, will be found to warrant. To make this understood by *our* scholar, the technical expedients in the doctrine of the formal syllogism, depending on the quality and quantity of propositions, and the relative situation of the three terms in the premises of a syllogism, must be further explained.

5. Propositions, in the doctrine of formal logic, are of four kinds; 1. Universal affirmative, signified by the letter A; as, "Every man is mortal;" "Every mare is a horse:" Universal negative, signified by the letter E; as, "No man is sinless;" "No goose is a swan:" Particular affirmative, signified by the letter I; as, "Some men are rogues:" Particular negative, signified by the letter O; as, "Some men are not rogues." These varieties of quality and quantity in the propositions, produce, when the propositions are formed into syllogisms, what are called the different *moods* of the syllogisms. Now the four symbols, A, E, I, O, and consequently the sorts of propositions that answer to them, can be varied by threes in 64 ways, so that we have 64 triads of propositions without any change of the relative situation of major, minor, and middle terms in each triad; which situation is this, that the middle term is subjected in the major premise, and predicated in the minor one; and, of course, the minor term, by its name, (see the previous section) is the subject of the conclusion, as the major term is its predicate. When, in forming a syllogism, the three terms are thus disposed relatively to each other, the syllogism is said to be in the *first figure*. There are three other figures. In what is called the *second figure*, the middle term is predicated in both premises; in what is called the *third figure*, it is subjected in both premises; in what is called the *fourth figure*, it is predicated in the major premise, and subjected in

the minor. And as in the first figure, we can have 64 triads of propositions, making up apparent syllogisms of so many different moods, we can, in all the figures, have four times 64, that is, as already stated, 256. But the laws of the syllogism exclude in the first figure all but four moods, A A A; E A E; A I I; and E I O: in the second figure all but four, E A E; A E E; E I O; and A O O: in the third figure, all but six, A A I; I A I; A I I; E A O; O A O; and E I O: and in the fourth figure, all but five, A A I; A E E; I A I; E A O; and E I O:—thus leaving, as above stated, out of 256, only 19 forms which are legitimate syllogisms; that is, which afford the demonstration proposed by the science.

6. In order that the nineteen legitimate forms of syllogism may be remembered by appropriate names, the symbolic letters of each are formed with consonants into words, otherwise meaningless,* and the words are put together so as to exhibit the following imitation of Latin verse:

Fig. 1. BARBARA, CELARENT, DARII, FERIOque prioris.

Fig. 2. CESARE, CAMESTRES, FESTINO, BAROKO, secundæ.

Fig. 3. TERTIA, DARAPTI, DISAMIS, DATISI, FELAPTON, BOKARDO, FERISO, habet: quarta insuper addit

Fig. 4. BRAMANTIP, CAMENES, DIMARIS, FESAPO, FRESISON.

Hence, for example, to say of a syllogism that it is in *barbara*, is to say that it is in the first figure, with a universal affirmative conclusion arising out of universal affirmative premises:† to say that it is in *camestres*, is to say that it is in the second figure, with a universal negative conclusion arising out of a universal affirmative major premise, and a universal negative minor premise:‡ to say that it is in *fresison*, is to say that it is in the fourth figure, with a particular negative conclusion arising out of a universal negative major premise, and a particular affirmative minor premise.§—It is to be

* There is a significant purpose in the added consonants, relating to the conversion of syllogisms; but considering the whole business to be mere trifling, we may be excused from a further detail.

† As, "Every man is mortal; every king is a man; therefore every king," &c.

‡ As, "Every true philosopher is one who counts virtue a good in itself; no advocate of pleasure is one who accounts, &c., therefore, no advocate of pleasure is a true philosopher."

§ As, "No fools are thoughtful; some men are thoughtful; therefore, some men are not fools."

remarked, before leaving this account of the formal syllogism, that a syllogism in any of the last three figures, can, under the safeguard of certain rules, be converted into a syllogism of the first, which is deemed the only perfect figure. For instance, the syllogism in the fourth figure exemplified in the third note below, can be converted into *Ferio;* as, "Thoughtful men are not fools: Some men are thoughtful: Therefore, some men are not fools." The fourth figure does not appear in Aristotle, but was added by his followers.

Recapitulation of the Leading Principles in this Manual of Logic; as opposed to the Principles on which (as explained in the foregoing Account) the Syllogism of Formal Logic is based.

7. In our logic, we presume not to inquire, much less to demonstrate, how or why an intellection takes place. We esteem it a fact, which can no more be accounted for than the fact of a sensation; though we estimate these facts as things in their nature different: we deem, for instance, that a sensation is one thing, and that the knowledge of a sensation, the result of intellection, is another.

8. We deny that, in using words for logical purposes, *three* operations of the mind are concerned. We affirm that the operation is always the same, however it may be signified outwardly,—that is, whether by single terms, or by complex terms, or by propositions, or by propositions united into forms of greater extent and complexity. We affirm, in short, that the difference between terms, and proposition, and syllogism, is a mere grammatical difference, having no foundation in any correspondent original processes of the mind, but being means sometimes convenient in one shape, sometimes in another, for fixing, or for developing the knowledge we have acquired, or for presenting it to another mind. For, in our doctrine, a single term, quite as much as a proposition, and quite as much as a syllogism, is an indication of knowledge arising out of premises. Thus *red* expresses our knowledge of a colour; which knowledge is the fact of our being aware of one sensation relatively to others of its kind; that is to say, we know what is red, because we know what it is not to be red; nor could we know the one, unless at the same time we knew

the other. That of which we have knowledge, and that by which we know it, are the premises,—the consequent knowledge is the conclusion expressed by this term. In a proposition, there is the same fact, with this only difference, that the premises are indicated as well as the resulting knowledge, though not indicated so distinctly as by the syllogism. In this last, the two premises and the conclusion are stated in so many sentences of independent grammatical construction; and the syllogism is therefore the most explicit form in which we can lay down what at any moment we know.

9. But in speaking thus of the syllogism, we do not mean the syllogism which operates by extremes and middle term, under the doctrine of affirmation and negation. With us, affirmation and negation belong to Grammar, not to Logic. *No man*, and *every man*, are equally signs of positive knowledge, in the one case arising out of the premises *no* and *man*, in the other out of the premises *every* and *man*. The same may be said of the knowledge expressed by *is-not*: it is positive knowledge, quite as much as that expressed by *is*. In all cases the resulting expression is one expression with one meaning:—Such is the datum of our syllogism, such the related argument. But these are no sooner expressed than the conclusion unites them and makes them one; so that now the whole syllogism is one expression with one meaning,—an expression of the knowledge attained or developed; just as a single term is such an expression; just as a complex term is such an expression; just as a proposition is such an expression.

10. With regard to the Categories, the GENERAL HEADS of all we know, they seem at present to have lost their reputation even with the Aristotelians themselves.* We may indeed fairly ask why they are so many, or why they are not more. As to one of them, RELATION, we affirm this to be included in all the others. A *substance*, whatever it be, is known, because we are aware of its *relation* to other substances; so of a *quality;* so of each of the other heads. We ask also, as to these general heads, or the special heads under them, or the singulars under these,—what is meant by calling them *ideas*. If by ideas is meant the *knowledge* which they signify,

* "The catalogue certainly is but a very crude one." Whately's Logic, Book IV. ch. II. § 1 (a foot note).

our only objection to the word is, that custom has rendered it, for this meaning, a vague and indistinct expression:—if other is meant than knowledge of the things to which the term can be applied, we object to its application in this way, till it can be shown what it is that words can signify other than things real, things ideal, (both of which come under the common term of things physical,) and things metaphysical: the words in all three cases being *immediately* significant of knowledge, which, in its nature, is distinct from the things comprehended by it; that is to say, words are, in all cases, immediately significant of what is metaphysical, but can next be applied as names to things real, or to things ideal, or to things which are neither the one nor the other, but are the relations under which those things suggest themselves to the human understanding, which relations we have the power to entertain apart from the things.

11. The science of the formal syllogism proposes a demonstration of its conclusions. Our doctrine is, that we cannot come to a false conclusion in deductive reasoning except by depending on the forms which that syllogism provides, and then neglecting its rules. The science, then, is necessary only to those who use its forms: to propose it for others, is to propose spectacles for people who, without them, cannot but see clearly, or crutches for people who, without them, cannot but walk well. The use of the syllogism in our logic, is, not to test the validity of conclusions, but to spread out our premises, that so we may be induced to consider on what grounds we have assumed them. In a word, our logic leads us always back to what we have acquired, or what we presume we have acquired, in order that, if our knowledge is not sound, we may supply its deficiencies, or set it altogether aside.

APPENDIX.

OUTLINE OF AN INTRODUCTORY COURSE OF INSTRUCTION IN LOGIC;

FOR PUPILS NOT YET COMPETENT TO ENTER ON THE STUDY OF THE WHOLE WORK.

In order to feel what he can, and what he cannot accomplish in developing his knowledge, the learner should at once be set to theme-writing.* All the instructions immediately required for this purpose will be found between Section 42, Chapter IV., and Section 4, Chapter V., both sections inclusive (pages 171–187). This having been diligently read and well considered, let a subject be chosen either from among those suggested, or from such as may occur in reading or in conversation. Say, that *Curiosity* is the subject chosen. It is most likely that his first thoughts will perplex and confuse him. He will be disposed to consider curiosity only as a mischief, an impertinence, a meanness, because his attention has been most frequently called to these effects; and yet he will suspect that some higher point of view should be taken, which may discover the good, as well as the bad effects of curiosity. A definition will here be needed,—"Curiosity, or eagerness of search after knowledge, is"—what? Let him reflect for a time, and he cannot fail to add something to the following purpose:—"either a good or an evil, according to the purposes to which it is applied." The subject thus branches into two, and his subsequent development will bring forth what his experience and reading make him know, first, of well-directed curiosity, and then of curiosity idly and impertinently directed.

It is not always necessary to begin by a definition. If the name of the subject is at once suggestive of all that it includes,

* We are here supposing the pupil to have passed through the Exercises pertaining to Grammar and to Rhetoric.

it will be best to begin, not by a definition, but by some very general proposition. In treating of *Industry*, for instance, it would be an obvious thing to say, that "It is the source of all the blessings of life." Having stated this general fact, which is to be developed by particulars, it is very likely that the young thinker will find himself lost amid the multitude that crowd into his mind. He is conscious that it will not do to note them down in heterogeneous order, just as they happen to occur, as in making out a catalogue:—how, then, must he proceed?—He must adopt some general heads, standing, as it were, midway between the first general statement, and the infinite particulars which still lie beneath:—for instance, he might go on to say, "First, let us see what industry does for the poor man:" and having developed his knowledge under this head, the following might be another: "Next, let us see what industry does for the young, and consequently ignorant person." Other heads might be, the effects of industry on sterile land, or on land partially covered by sea; on the people of a whole country; on the arts which refine a people; and on the sciences which improve those arts. His mode of developing this subject would be a guide in developing the opposite,—*on Sloth*, of which subject, the following is an outline for his guidance; and to it are added a few other outlines, after filling up which, it is hoped that further assistance of the same kind may be discontinued.

On Sloth. 1. It is the root of all evil: what condition it brings even a rich man to. 2. What it prevents in the young. 3. What will be the character and condition of a once flourishing farm after years of neglect by a slothful owner. 4. What effect sloth produces, or is likely to produce on a whole people. 5. What effect it has upon the bodily health. 6. What effect on the mind and morals.

On Enthusiasm. Ardour of mind engendered by something that affects the imagination: may be an evil;—may be a good. 2. An evil whenever it operates against reason—for instance, in certain enterprises; in the religious temper of the mind; in the reception of new opinions. 3. A good, when it is controlled by reason—for instance, in our enterprises, in our religious feelings, in our opinions. 4. It ministers to excellence in the fine arts; it confers the capacity for appreciating and enjoying them.

On Good Temper. A greater good than any other personal endowment, or other gift of Providence. For every thing is valuable in proportion to the happiness it secures. Now a good temper, &c. A good temper may be the gift of nature, but it may also be the growth of reason and habit. For let a person be convinced, &c., and let him day by day, nay, hour by hour, watch and control, &c.

On Happiness. 1. Is the great object of all our actions: the ways are different:—this man imagines it is to be found in, &c.; another in, &c.; a third in, &c. Some suppose, &c., others, &c.—But though the ways are thus different, the end is ever the same, namely, &c. 2. The greater number of these supposed ways must be wrong; for the greater number of those who follow them confess that, in their several pursuits, they never reach their object. 3. Happiness exists in the mind, and only to a certain extent is it dependent on external circumstances. 4. What the circumstances are, both external and internal, on which happiness depends.

On Liberty. 1. A subject that seldom fails to raise our warmest emotions: we think of the heroes of Greece and of Rome, of Switzerland and of Britain:—say, who they were, and what they attempted. 2. Our love of liberty is justified by the evils that attend a state of slavery: develop these evils. 3. But liberty must not be confounded with licentiousness. Shew that wherever there is real liberty, there is subjection to authority, which controls the evil-intentioned, and protects the good.

On Self-knowledge. 1. All moral improvement depends upon it. If we know not our defects, we cannot, &c. 2. What are the hindrances to self-knowledge. 3. What will follow in proportion as we improve in it.

On Self-denial. 1. Consists in abstaining from some present gratification for the sake of greater expected good: is the great principle of religion, and of morals: of religion; for all the rewards which she holds out, are promised on the condition, &c.: of morals; for all the virtues imply that we resist, &c. 2. Self-denial is necessary, in a certain degree, to real enjoyment; for, &c.

On Obedience. Our progress in virtue, in knowledge, and in happiness, depends upon it: first in virtue; for we must conform to the laws, &c. 2. Secondly in knowledge; be-

cause we learn from others, either by teachers who communicate through the ear, or by books, which communicate through the eye; and if, &c. 3. Thirdly, in happiness; because we are prone to evil courses, in other words, to courses that end in misery, from which we can be preserved only, &c.

On Adversity. To creatures whose present existence is a state of trial, is calculated to be an ultimate good: first, by opening the heart to fellow feeling with the woes of others. 2. Secondly, by correcting vices engendered by prosperity, namely, &c. 3. Thirdly, by qualifying us to enjoy what is good, when the good returns; for he who knows not, &c., cannot truly know and enjoy, &c.

On Habit. 1. Is second nature: whatever is possible to be done, however difficult at first, is made easy by repeated trials, in other words by acquiring the habit: examples from the arts. 2. If it forms our practice in the mechanic and the ornamental arts, it has equal power in forming all our practice; hence our conduct in life will be dependent, &c. 3. However much we may wish to be good, yet if our habits, &c. On the other hand, our temptations to evil will be less strong, if our habits, &c.

On Order. 1. Is of the utmost importance in all the concerns of life. It conduces to comfort in a household; for, &c. 2. It is the source of internal prosperity and external strength in a nation; for, &c. 3. It is necessary in our studies, because in all things to be learned there is subordination of one part of knowledge to another; and if, &c. 4. It forms the virtues; for each virtue has its bounds as, for instance, &c.

On Time. 1. Is, with regard to every human being, the opportunity for accomplishing the great ends of his existence. These are, happiness here, and immortality hereafter. To secure happiness here, we must, &c. 2. To secure happiness hereafter, we must so rule our present conduct, as, &c. 3. The short period of the longest life, calls upon us, &c.

On Prejudice. 1. Is the habit or act of thinking and speaking, as if we had certain knowledge, when the subjects are such or so circumstanced, that we know either nothing about them, or very little. All persons are liable to prejudices, sometimes erring by being favourable, sometimes by being unfavourable:—for instance, when we see any one for

the first time, &c. So when we visit foreign countries, and see manners and customs different from our own, &c. Continue with other instances. 2. But though all persons are liable to prejudices, all persons are not governed by them. It is in this respect that people differ, and they differ greatly. One man is unconscious of his prejudices, and accordingly, &c. Another man is quite aware of the different character of his certain and uncertain knowledge, and therefore takes care, &c.

On Truth. 1 (see in the Index). 2. If we speak of Truth under three points of view, we may distinguish it as Moral, Scientific, and Divine. Moral truth is opposed to falsehood: it is the conformity of our words and actions to our thoughts. Thus we are said to speak the truth when, &c. In such a case, what we say may not be scientific truth, yet if, &c. 3. Scientific truth is that which we reach by study and experiment. Its amount will consequently be different at different periods of one's life, and at different periods of the world. Exemplify each observation. 4. Divine truth is that which belongs to the Deity, portions only of which He reveals to his creatures. Where do we find such revelation?

On Youth. 1. It is that part of life which presents the greatest number of enjoyments, the most important opportunities, the dangers most to be apprehended. 2. The enjoyments. 3. The opportunities. 4. The dangers.

On Age. 1. Though a state which we may not all attain, is one for which, throughout the previous parts of life, we should all make preparation. The nature of this preparation, that so, old age, if we reach it, may be happy. 2. The blessings of age when the proper preparation has been made.

On Solitude. 1. Is a state not meant for man, yet, as an occasional state, indispensable to the formation of some of the best qualities of our nature. Its likely effects on the understanding, and thence on the heart. 2. The unreasonableness of devoting life wholly to solitude.

On Society. 1. The nature of man is such as to demand society, both for the development of his powers, and for providing his true means of happiness. Prove these points. 2. How we may fail of these effects, though always in society.

On Geography. 1. Define it. 2. It must have begun by the knowledge of small tracts of the earth's surface:—

show in what way the knowledge must have increased,—travellers—commerce—inventions. 3. Its use in accompanying the study of history.

On Astronomy. 1. Define it. 2. The shepherds of Chaldea are the first recorded astronomers. Keeping watch over their flocks by night under a clear sky, they, &c. 3. What was the Ptolemaic system, and what is that which now has its place? 4. The kind of emotions which astronomical inquiries produce. 5. The practical benefits which the science yields.

On Agriculture. 1. One of the two primeval occupations of mankind—explain the fact. 2. All wise nations have held, and still hold, the cultivators of the land in high respect. Give proofs.

On Commerce. 1. Its necessity to the well-being and improvement of our race. Its simplest state. Indications, from history, of its early existence. 2. The states that, in modern times, have successively flourished by means of commerce.

On Morals and Manners. 1. These are not the same, though they are understood to imply each other, and though, to be perfect, they must go together. That they are not the same, is proved by the facts which we often witness, of a man sterling in morals without the recommendation of manners; and of one of superficially agreeable manners concealing the most corrupt morals. Explain the regret which accompanies our observation of either fact. 2. The union of morals and manners necessary to the perfection of both: there must be something deficient in morals themselves, if manners are wanting; and manners must often betray their flimsy character, if they do not rest on morals.

On Religion and Superstition. 1. Light and darkness are not more different than, &c., and yet, &c. Religion is the friend of man; Superstition, &c. Religion is clear-sighted, considerate, compassionate; Superstition, &c. Religion is full of hope, and rational though humble confidence; Superstition, &c. 2. The deficiencies through which Superstition gets possession of the mind, explained by the kind of persons in whom it is found, and the places where it most prevails. 3. The kind of persons in whom genuine religious feelings are observed, and the places where genuine religion is found.

*** *While the learner is prosecuting his practical exercises in logic, he should be required to study such parts of the Manual as will fit him to answer the following questions; reserving his study of the entire work for a more mature state of his undertaking.*

CHAPTER I.

Sect. 1, page 101. With what branches of learning is logic connected? In what different ways are the three branches you refer to, concerned with language? What is meant by the sense of a single word? What is meant by the sense of two or more words combined?

Sect. 2, ib. Explain the difference between induction and deduction.

Sect. 3, ib. Is there any difference between the grammatical and logical function of a word, and between logical and grammatical completeness?

Sect. 4, page 102. Who are they that learn and practise logic, both inductively and deductively?

CHAPTER II.

Sect. 11, page 113. What is the true process of inductive logic? What too often happens in this process? What is a powerful method of bringing a pupil to a consciousness of his deficiencies in the inductive process?

Sect. 12, ib. From what does all unrevealed knowledge originally spring? How are we led into the presumption that we can, of ourselves, know more than experience teaches?

Sect. 13, page 114. How are we preserved in the metaphysics of quantity (mathematics), from wandering among proofless abstractions?

Sect. 14, ib. How, in using words denoting things of sense, are we saved from inutility of thought?

Sect. 15, ib. In using the name of an abstraction,—say, *pride* instead of *proud*,—while we must apply *proud* to certain persons or certain acts, and we do not so apply the former word, we immediately mean by it nothing but the abstraction:—what have we in consequence to do? What is the the danger, ("Now the danger is," &c., page 15) when we

thus use a word to denote, not immediately, the things we know, but the form of thought under which we are *supposed* to include certain things which we know?

Sect. 16, page 115. In such phrases as the following, what have we to remember as essential differences:—*the pride of John, the brother of John; John's pride, John's brother: pride belonging to John, houses belonging to John; John possessing pride, John possessing houses?*

Sect. 17, page 116. If there is nothing within the reach of our human faculties to which a word is applicable, what interpretation should we give it?

Sect. 18, page 117. What have you to remark concerning knowledge, and the things that originally suggest it? What things exist as the subjects of thought, beside real things?

Sect. 19, ib. and 119. What are things ideal?

Sect. 20, page 118. What is a thing metaphysical? Give examples.

Sect. 21, ib. Of what things are words that are parts of speech the immediate signs? What differences of application are there among these words?

Sect. 22, ib. What is a proper name?—a common name?—a name abstract? How may a name abstract become a common name?

Sect. 23, page 119. Are not words very flexible—by which I mean liable to different extent of meaning? What three points are to be kept in mind relatively to what you have just admitted?

Sect. 24, ib. What is the etymological sense of a word? Give examples.

Sect. 25, ib. What is the general sense of a word? Give examples.

Sect. 26, page 120. What is the special sense of a word? Give examples.

Sect. 27, ib. In the use of signs to advance and fix knowledge, what operations occur?

Sect. 28, ib. What is abstraction? Give examples.

Sect. 29, ib. What is generalization? Give examples.

Sect. 30, ib. What is specialization? Give examples.

CHAPTER III.

Sect. 4, page 134. State the different kinds of definitions.

Sect. 5, ib. What is a Nominal definition? Give examples.

Sect. 6, page 135. What is a Real definition? Give examples.

Sect. 7, page 136. What is an Accidental definition? What is a Property? Explain what, in different cases, is an Accident in Logic.

Sect. 8, pages 137, 138. What is an Essential definition? Give examples. Into what two kinds does an essential definition divide? Give instances. Define *Pride*, so that you cannot speak of a proper pride: define it so that you can.

CHAPTER IV.

Sect. 1, page 140. What is Deductive logic?

Sect. 7, page 145. When we intend to develop our knowledge, what have we first to choose? What may be the different forms of titles?

Sect. 8, page 146. Suppose our subject is expressed by a single word, what is the first proof that can be given of the existence of the knowledge presumed to be included under such title? Are we always obliged to begin by a definition? Define some of the things you see around you.

Sect. 9, ib. Suppose a subject to be given out in such a form as the following—*On a Knowledge of the World*—is it more or less limited than if given out thus—*On Knowledge?* Are we tied, in the consideration of such subjects, to any definite number of points or purpose of development? Suppose our subject to be stated in the form of a proposition, as—*A proper knowledge of the world is favourable to virtue*,—will the plan of treatment be quite open to choice, as with subjects stated in the previous ways?

Sect. 10, page 147. What is an Argument? Give instances. What three things exist in every argument?

Sect. 11, ib. From how many sources do arguments take their technical names?

Sect. 12, (including title,) page 148. What are the names of External Arguments? Is not all our knowledge originally

suggested by things external? Then why do we call certain arguments internal?

150 (title.) Mention the names of internal arguments.

Sect. 13, ib. When are we said to reason from definition? Give instances.

Sect. 14, ib. When are we said to reason from Etymology? Give an instance.

Sect. 15, pages 151, 152. When are we said to reason from Enumeration? Give instances. What is the argument from enumeration sometimes confounded with? Give an instance of an inductive argument. How is the difference between an argument from Enumeration and from Induction done away with?

Sect. 16, pages 153, 154. When are we said to reason from the Genus? Give instances. What is left to the topic Species for its usual mode of proof? Give an instance.

Sect. 17, page 154. When are we said to reason from the Cause? Give instances. Give an example of what is called an Inference.

Sect. 18, page 155. When are we said to reason from the Effect? Give instances.

Sect. 19, pages 155, 156. What Latin phrases often occur in logic, implying the same as argument from cause, and argument from effect? How do you define *a-priori* reasoning? What is *a-posteriori* reasoning?

Sect. 20, p. 157. As every cause is an Antecedent, why do we not consider every antecedent to be a cause? Give an instance of an argument from antecedents.

Sect. 21, ib. As every effect is a consequent, why do we not consider every consequent to be an effect? Give an instance of an argument from consequents.

Sect. 22, page 158. When are we said to reason from the Adjuncts? Suppose we develop our knowledge of John by all that constitutes his history, why shall we be said to reason from the Adjuncts or Accidents of our subject? What did the ancients mean by Essence? What are Accidents? What are Properties?

Sect. 23, page 159. What general head of several topics have you now to mention? Give an instance of reasoning from Similitude;—from Analogy, or Parity of case;—from Contraries;—from Proportion. Page 160: When are we said to argue *a fortiori?* Give an instance.

Sect. 24, page 160. Explain the phrase *Cæteris paribus.* Explain *Mutatis mutandis.* Exemplify their use.

Sect. 25 (and Title), ib. What is the next source whence the names of arguments are derived? Page 161: What do you call the first two propositions of a syllogism when taken together? What are they called separately? Give an instance to show that it is sometimes indifferent which of the two premises we call the datum, and which the argument. What, for the most part, will be the premise to which the name datum will be properly applied?

Sect. 26, page 161. When are we said to use the *Argumentum ad judicium?*

Sect. 27, ib. When is it that, in reasoning to oneself, one may be said to use the *Argumentum ad hominem?*

Sect. 28, page 162. When are we said to use the *Argumentum ad doctrinam?* Give an instance.

Sect. 29, ib. When are we said to use the *Argumentum ad verecundiam?* Give an instance.

Sect. 30, ib. When are we said to use the *Argumentum ad fidem?* Exemplify your meaning.

Sect. 31, page 163. In what manner may a person wilfully go astray in his own thoughts? What expedient in rhetoric, will such error in logic correspond to? Give an example.

Sect. 32, ib. What error in one's own reasoning corresponds to what is called *Argumentum ad passiones?* Give an instance.

Sect. 33 (and Title), ib. What is the next source whence the names of arguments are derived? Does the reasoning process necessarily change with the changing forms of language? Page 164: Explain, as one instance for many, what it is to have the knowledge which the word *man* expresses. When we know *man* to be a rational animal, how may that knowledge be developed in a syllogism? Why may the syllogism be deemed the fundamental form of reasoning?

Sect. 34, page 165. Give instances to show that two words, properly put together, are tantamount to a syllogism. Page 166: What may be regarded as the original form of speech in which knowledge is developed in deductive logic?

Sect. 35, page 166. Give an instance of what you call the original form of speech, but so constructed that each of the two parts is made up of many subordinate parts, and these

again of others, till at length we reach the mere grammatical parts.

Sect. 36, page 167. Although the period constructed of noun and verb, is the original form of logical development, yet to what form do logicians more commonly refer all other forms?

Sect. 37, ib. What is an Enthymeme? Give instances.

Sect. 38, ib. What is a Sorites? Give an instance.

Sect. 39, page 168. Is Logic, or is Grammar, the department of learning concerned with the distinction of propositions as affirmative or as negative, as categorical or as hypothetical (or conditional)? Give instances of these different sorts of propositions.

Sect. 40, page 169. What is a Dilemma? Give instances of data which can be unfolded into syllogisms exemplifying the dilemma. Unfold the instances into syllogisms. Page 170: Give an instance of the method of reasoning called *Reductio ad absurdum.*

Sect. 41, page 170. What is an Epichirema? Give an instance of a syllogism which may be the foundation of an epichirema. I will now develop this syllogism so that it shall be an epichirema: what have I added to the datum? What to the argument? Page 171: In what brief manner would rhetoric lead you to say all this?

Sect. 42, page 171. In following out the exercises you will have to write, what are you cautioned against?

Sect. 43, ib. How is improvement in logic best promoted? What does the word *theme* properly mean? What may it also mean?

Sect. 44, ib. When the subject of a theme is expressed by a mere grammatical noun, what kind of thing, different at different times, may it be the name of? What, at different times, will the name itself be? Page 172: Give instances of what you state.

Sect. 45, page 172. Give a few instances of subjects which are things metaphysical under names abstract. In treating these, where may you find certain cautionary principles that you ought to keep in mind? Now say, how you would in general begin, and how proceed, in developing your knowledge on such subjects. Page 174: Give some other instances of subjects that are things metaphysical under names abstract. How would you in general begin, and how proceed, in treating these?

Sect. 46, page 175. What are internal, and what are external arguments, otherwise called? When a real or an ideal thing is given out for treatment, what makes a development of our knowledge difficult? Page 176: Suppose Socrates were given out for a theme, how should we treat it objectively? Under what implied title might we otherwise treat it?

Sect. 47, page 177. The title of a theme, you formerly told me, might be a mere grammatical noun-substantive, or a logical, that is, a constructed noun:—in what other way can a theme be given out? Page 179: Mention a few *theses*.

CHAPTER V.

Sect. 1, page 180. By what three ways will a theme-writer be liable to logical errors in his deductive practice?

Sect. 2, ib. What is Verbiage?

Sect. 3, page 182. What, when it becomes evident in language, does confused Reasoning arise from?

Sect. 4, page 184. What is Disjointed Reasoning?

Sect. 5, page 187. Under Verbiage, what are more special names for errors in logical deductive practice? What designations, still more special, come under Petitio-principii? What under Non-sequitur? What under Error in distinction or division? Under Confused reasoning, what are the special descriptions of faults? Under Disjointed reasoning, or Ignoratio elenchi, what are the special descriptions of faults?

Sect. 6, page 188. What is Begging the question? Give an instance. Correct the instance in different ways.

Sect. 7, page 189. What is an Identical proposition? Give instances.

Sect. 8, page 190. When you mean to give a verbal explanation of a word, is it a fault to use for the purpose another word having the same meaning? When will it be verbiage to do so? The following is given as an example of the fault of Explaining a thing by itself: "Justice regards both magistrates and private individuals: the former show themselves to be influenced by it when they make an equitable distribution of rewards and punishments; the latter, when they are sincere in their words, and just in their dealings." Correct the example.

Sect. 9, ib. When does the error of Reasoning in a circle, take place? Page 191. Give an obvious example.

Sect. 10, page 192. When are Premises irrelevant? Give an example.

Sect. 11, page 198. When you prove too little, what sort of logical fault must it be? Give an instance. In all cases of proving too little, what do you mentally supply? Page 199: Give an example of an inference, in contradistinction to a necessary conclusion, and let your inference have the utmost certainty that an inference can have. Give a further instance or two of the error of proving too little.

Sect. 12, page 200. Why will proving too much be a non-sequitur? Give an example. Correct the example. Page 201: In any case of proving too much, as in any of proving too little, an unwarranted datum is assumed; but what is the difference of the datum in the two cases? Give a further instance or two of the error of proving too much.

Sect. 13, page 202. What general form of verbiage do we next reach? What is the species you have here to speak of? Give instances of the fault. I will repeat your instances, and you must correct each instance as I go on.

Sect. 14, page 203. What is a cross division? Give instances. I will repeat your instances, and you must correct each as I go on.

Sect. 15 (and Title), page 204. What description of faults come now to be noticed? What is the particular sort you have here to speak of? Page 205: What will be the effect of saying other than we mean, even supposing we are not entirely misunderstood? Give instances. I will repeat your instances, and you must tell me, after each, what the reasoner truly means. Page 206: Is it a fault to use a sentence that can be understood in two ways? Give some further instances of sentences that do not clearly say what is meant. I will repeat your instances, and you must correct each as I go on; rendering meaning in two ways when you are not sure of the one intended.

Sect. 16, page 207. To what fault is that of *Not distinguishing different senses of the same word*, opposed? What might our present title be? Page 208: How far are we at present concerned with this fault? I will read, as an instance, the faulty passage, which runs thus: "To write well is an

accomplishment," &c. Now tell me in what way it is wrong. I will read the next example: "It is better to be sensible," &c. Tell me the faulty parts, and correct them.

Sect. 17, page 209. What are the means which grammar provides, for the clear development of thought by words? While grammar looks to accuracy in the outward structure of language, what is it that logic must care for? Give a rule concerning what a sentence should not be made to bear. I will read each of the three examples, and you must tell me, after each, the nature of the fault.

Sect. 18, page 211. What is the Latin term for the errors that come next under notice? What may the phrase mean? Describe the sort of learner who is especially liable to such errors as you mention. Page 212: What is the effect of what we call *thinking* upon the relations which constitute our knowledge? I will read you the example of part of a theme in which several propositious are required to make the train of thinking clear: "The treasures of wisdom," &c. Now tell me how you would correct this.

Sect. 19, page 213. What ought a proposition *not* to contain? Give an instance. In order to keep clear of even seeming to promise too much, what should the theme-writer avoid? I will read you the instance: "Having thus described and illustrated," &c. Now, correct it.

Sect. 20, page 214. When does the fault of *Deviating from the proposition* occur? I will read you the instance: "Anger has been called a short madness; and people," &c. Now describe how it is faulty.

Sect. 21, ib. What does the fault of *Discoursing short of the proposition* arise from? Page 215: Is a writer always bound to treat a subject in the general way in which it may be given out?

Sect. 22, page 215. What does the fault of *Discoursing wide of the proposition* arise from? Page 216: What person may a writer be compared to, who is guilty of the fault? I will read you the two examples of the fault, and you will say, after each, why it is wrong. Page 217: Give instances to show that an indistinct view of a subject may be betrayed by a single expression.

KEY

For Correcting, at Pages 203, 204, and 206, the Sentences Logically Defective.

Page 203.

This great politician desisted from his designs, when he found them impracticable.

He was of so high and independent a spirit, that he abhorred being in debt.

Though raised to an exalted station, he was a pattern of piety and virtue.

His end soon approached; and he died with great fortitude.

He was a man of so much pride, that he despised the sentiments of others.

Poverty induces dependence; and dependence increases corruption.

This man, on all occasions, treated his inferiors with great disdain.

There can be no order in the life of that man, who does not allot a due share of his time to retirement and reflection.

Such equivocal expressions, mark an intention to deceive.

His cheerful, happy temper, keeps up a kind of daylight in his mind, and fills it with a steady and perpetual serenity.

Page 204.

The things brought out to me, were some square, some round; some white, some blue, some red; some natural, some artificial.

He was a man of extensive riches, high birth, and exalted virtue; quick to discover fraud; very generous, and of great temperance.

In treating of poetry, I shall consider it under the heads of Epic, Lyric, and Dramatic; Ancient and Modern; Classical and English; Written-in-rhyme, and Written-in-blank-verse.

Men, as to constitution, temper, and habits, are phlegmatic, sanguine, or choleric; gay or gloomy; devoted to pleasure, or devoted to business.

Page 206.

The Romans shall, I say, subdue Pyrrhus. *Or*, Pyrrhus shall, I say, subdue the Romans.

The duke yet lives that shall depose Henry. *Or*, Henry shall depose the duke that yet lives.

The rising tomb bore a lofty column. *Or*, a lofty column bore the rising tomb.

And thus the son addressed the fervent sire. *Or*, Thus the fervent sire addressed the son.

And a solemn stillness holds all the air.

He was mounted upon a hot and fiery steed, which seemed to know his aspiring rider.

If this day happen to be Sunday, then on the next day following, this form of prayer shall be used and the fast day kept.

A collection is making to protect and uphold such electors, as, regardless of threats and unmindful of intimidation, refused to vote, contrary to their desires and consciences, for A. and B.

He was more civil to me than he commonly is. *Or*, He was more civil to me than people commonly are to one another.

You can arrive in time, only by starting early. *Or*, You can do no more than arrive in time, by starting early.

Though he had been charitable to others, he found but few friends in his own extremity.

Persons having an income not amounting to a hundred and fifty pounds a year, are not liable to the income-tax.

The Romans understood liberty as well, at least, as we.

Theism can be opposed only to Polytheism or Atheism.

These are not such designs as any man who is born a Briton, ought to be ashamed or afraid, in any situation, in any circumstances, to avow.

The hen being in her nest, was killed and eaten there by the eagle. *Or*, The eagle having killed the hen, carried off her prey, and depositing it in her own nest, eat it there.

It has been said that Jesuits can not only equivocate. *Or*, Jesuits are not the only persons that can equivocate.

You will not think that these people, when injured, have no right at all to our protection. *Or*, Have less right than others to our protection.

Solomon, the son of David, and the builder of the temple of Jerusalem, was the richest monarch that reigned over the Jewish people.

Solomon, whose father David was persecuted by Saul, was the richest monarch of the Jews.

Lisias, speaking of his friends, promised his father never to abandon them. *Or*, Lisias speaking of his father's friends, promised his father never to abandon them.

The Divine Being, ever liberal and faithful, heapeth favours on his servants. *Or*, The Divine Being heapeth favours on his liberal and faithful servants.

Every well-instructed scribe is like a householder, who bringeth out of his treasure new things and old.

Dryden, in the following words, makes a very handsome observation, on Ovid's writing a letter from Dido to Eneas.

Imprudent associations disqualify us for instructing or reproving others. *Or*, Disqualify us for receiving instruction or reproof from others.

ALPHABETICAL INDEX

TO THE

MANUAL OF RHETORIC, AND THE MANUAL OF LOGIC.

ADAPTED NOT ONLY FOR REFERENCE, BUT FOR OCCASIONAL FURTHER INSTRUCTION.*

*** The first figures indicate the page: those within parenthesis, the section.

ABSTRACT, Abstraction. *Abstract* means, drawn off or separate from that in which it adheres, and which is called the CONCRETE. Thus, *white* or *whiteness* indicate an abstraction from any white substance; as, for instance, from *a white man;* which expression being applied to a particular white man, is the name of a concrete, though, till so applied, the name is abstract. All words have an immediate correspondence only with things abstract; page 109 (10). And many words are doubly abstract; *ib.*; also, 114 (15). A name or noun abstract is distinguished in logic from a name proper, and a name common; 118 (22).

Absurd, Absurdity, Reductio ad absurdum. *Absurd* means, contrary to reason. An assertion may be false without being absurd: it is false but not absurd to say that London is the capital of France. Absurd is what in thought *cannot be;* false, what in fact *is not.* It is absurd to say that a straight line can be a crooked one; *false* would be a word wrongly used in such a case. For an example of *Reductio ad absurdum*, see 169 (40).

Accents. These are otherwise called slides or inflections of the speaking voice; 57 (7).

Accident, Accidental. *Accidental*, in logic, means sometimes happening, and sometimes not. Accidents are also called Adjuncts; 7 (II. 2); and 158 (22). An Accident must be distinguished from a Property; and an Accidental definition from an Essential one; 136 (7). Accident is one of the Aristotelian predicables; 220 (4).

Accumulation. This, in rhetoric, is otherwise called Synathrœsmus; 16 (12).

* Controversial points, though they could not be altogether avoided in the body of the foregoing Manual of Logic and its Notes, (into the latter of which they are principally thrown,) are reserved for some further elucidation in this Index; over which the reader is requested to cast an inquiring glance, even though he may not have occasion to refer to it for the usual purposes of an Index.

Adjective. In logic, the *difference*, in a definition, is expressed by an adjective, which may be a mere adjective, or a logical, that is, a constructed adjective; 137 (third foot-note).

Adjunct. See Accident.

Affirmation, Affirmative. An affirmation or affirmative proposition is distinguished, in Aristotelian logic, from a negative one; 223 (5): in our logic, the difference is considered to be purely grammatical; 167 (39), and 226 (9); unless indeed when one person says *no*, or what is tantamount, and we oppose it by *yes*, or what is tantamount. See Positive.

Aggregate. This is one of the sources of sophistical delusion; 125 (35); and 197 (the Syllogisms).

Allegory. A method of speech proper only to rhetoric; 20 (19).

Alliteration. One of the minor expedients of rhetoric; 19 (15).

Anabasis. That which in rhetoric is otherwise called climax or gradation; 16 (12).

Anacœnosis. Communication, one of the expedients of rhetoric; 21 (23).

Anacolution. A failure of the grammatical construction, vindicated for the purposes of rhetoric; 15 (11); see also 70 (first foot-note).

Analepsis. A rhetorical method of recovering the construction of a period in proceeding to complete it; 14 (9).

Analogy. Parity of case, one of the topics of internal argument, 8 (II. 3); 159 (23).

Analysis. In logic, the procedure of the understanding in which we seek or seem to seek a conclusion not yet attained, in contradistinction to *Synthesis*, in which we first lay down what we intend to prove. The former is a *disentangling* of arguments; the latter a *putting* of arguments *together*. The former is the Inductive process; the latter, the Deductive.

Anaphora. A method of analepsis; 14 (9); 17 (12).

Anastrophe. A rhetorical transposition; 15 (10).

Antanaclasis. A term in rhetoric used in two ways; 14 (9); and 18 (14).

Antecedents. One of the topics of internal arguments; 7 (II. 2); and 157 (20).

Anticlimax. In rhetoric, the opposite proceeding to climax; 16 (12).

Antimetabole. A sort of antithesis in rhetoric; 18 (14).

Antithesis. Opposition of meaning and of words; 17 (14).

Antonomasia. In rhetoric, the use of a proper, for a common name; 20 (19).

Aparithmesis. A term in rhetoric for *enumeration;* 16 (12).

Apodosis. The former of the two members of a period; 14 (7).

Apophasis. The same in rhetoric as *paraleipsis*, or omission; 21 (23).

Aporia. An expedient in rhetoric, when the speaker chooses to appear in a state of doubt; 21 (23).

Aposiopesis. An expedient in rhetoric when the speaker chooses to hold back what he pretends he was about to say; 15 (11).

Apposition. A grammatical repetition of a noun in the same case, often used with good effect in rhetoric; 14 (9).

A-posteriori. An argument from the effect, as distinguished from an argument A-priori, or from the cause; 7 (II. 2); and 155 (19).

Apostrophe. A rhetorical address to an imaginary, a dead, or an absent person; 22 (24).
Apprehension. Erroneously considered by the Aristotelians to be a distinct operation of the mind, and divided into Incomplex and Complex; 144 (foot-note); 218 (3); 225 (8).
A-priori. An argument from the cause, as distinguished from an argument A-posteriori, or from the effect; 7 (II. 2); and 155 (19).
Argument; Argumentum ad judicium; ad hominem, &c.; Argumentative. An *Argument* is that which being itself admitted to be true, proves something else to be true; 147 (10); Arguments derive their names from three sources, 147 (11); Arguments investigated for the purposes of Rhetoric; 3–9 (I. 1.–II. 3);—for the purposes of Logic; 148–171 (12–41). The Argumentative, in rhetoric, is comprehended under Didactic composition; 2 (4).
Aristotle. The doctrine of the syllogism as taught by him and his followers, repudiated; 102 (note to Chap. I.); 142 (note to Sect. 2); 144 (foot-note). His doctrine of definition the only useful part of his logic; 129 (1). Alluded to as a juggler, but one who deceived himself before he deceived others, 219 (foot-note). See also in this Index, Formal Logic. See further in this Index, Philosophy, Philosophers.
Articulation. A constituent part of oral speech; 56 (2).
Asteism. A civil kind of sarcasm; 20 (21).
Asyndeton. The omission of conjunctions for the sake of rhetorical effect; 16 (12).
Attention. The will to retain a present state of the understanding by means of that which suggests it, till other states arise that are related to the first in a desired and expected manner.
Auxesis. A method of rhetorical exaggeration; 21 (22).

Barbarous words. An Exercise for avoiding; 28.
Bathos. A sinking in expression, which is almost always a fault; 16 (12).
Blacklock. The blind poet of Scotland,—an allusion to his case; 109 (note to the previous Section).
Being. A name including every possible subject of thought, except Not-being; 130 (2). See Thing, in this Index.

Cæteris paribus. Other things being equal, a Latin phrase often used in argument; 160 (24).
Case. State of the *case* is one of the parts of a judicial oration; 10 (2); 84, 85.
Catabasis. A descent or sinking in expression, otherwise called Bathos; 16 (12).
Catachresis. A metaphor bold to excess, an *abuse* of figurative speech to gain a certain end; 19 (17).
Category, Categorical, Categorematic. *Categorical* means collected or assembled in order to declare: hence it means positive as opposed to hypothetical. A category is a class of assembled things; 130 (2). Aristotelian Categories; 220 (4); and 226 (10). *Categorematic* is an expression used by the Aristotelians to denote a word which is capable of being employed by itself as a term, as *man* and *mortal*, in saying

Man is mortal. If a word cannot be so employed, as, for instance, an adverb, a preposition, &c., they call it Syncategorematic. In our system, a Categorematic term will be better called, *a logical part of speech unconstructed;* and a Syncategorematic term, *a mere grammatical part of speech.*

Cause. One of the topics of internal arguments; 7 (II. 2); 154 (17). A cause is that which we have found by experience to have one uniform consequent or consequents; 157 (20). It must be added, however, that this is not all that makes up what we mean by *cause.* We conceive an antecedent *Will* wherever there is an effect, and if the immediate antecedent cannot have a will because devoid of sense, we go to a higher Will that disposes all things, and among them the conditions of the immediate antecedent with relation to its uniform consequent.—See at Philosophy, Philosophers, in this Index, the concluding remarks.

Characteristic. In logic, the same as specific; 137 (8).

Charientism. A civil kind of sarcasm; 20 (21).

Circle. The etymological sense of the word *period;* 14 (7). The fallacy of reasoning in a circle; 190 (9).

Class, Classification. By *class,* we mean, several things assembled under one common designation. *Classification* is the origin of logical definition; 130 (2). Order, genus, kind, species, sort, variety, are words that mean the same as class.

Climax. A gradation, or rising of one circumstance above another in speaking; 16 (12).

Colloquial. *Colloquial* style; 12 (2). Exercise for improvement in; 32.

Common name. A name applicable in common to many things; 118 (22).

Comparison, Comparates. *Comparison* is the generic name of several topics of internal arguments; 8 (II. 3); 159 (23). *Comparates* are any two things which are compared together.

Composition. As a general term, it implies a putting of parts properly together to form a whole. Accordingly in literature, it is the formation of discourse according to the laws of grammar, of logic, and of rhetoric.

Conceits in poetry. See Fancy.

Conception. *Conception* is thus distinguished from Perception:—When we see, or hear, or feel, or touch, or taste, we have a *perception* of the thing seen or heard, &c.; but if, not seeing, or hearing, &c., we nevertheless have the thing mentally present, we are said to have a *conception* of it. A conception is otherwise called an idea; but note, that idea is liable to many other applications: see 108 (9, 10, and the following note); 117 (19, 20).

Concrete. The whole of that from which we mentally draw off (abstract) what we think and speak of separately. Every word stands immediately for what is abstract, but if it should be a noun common or a noun proper, the moment we apply it to a real or ideal person or thing, it is the name of a concrete, and may then, and not till then, be called a name-concrete. An adjective, as *foolish,* cannot be a term-concrete, though it may be a part of such a term, as of the phrase *a foolish saying,* which is a concrete name when applied to some particular saying. The forms of language often lead us to mistake mere abstractions for things concrete; 115 (16).

Conclusion. The expression which declares what the understanding attains or deduces from *premises;* 101 (1); 141 (2); 147 (10). Conclusion in the deductive process distinguished from Inference in the inductive; 164 (34).

Concurrent probabilities. A rhetorical delusion in speaking of them; 125 (35).

Conditional, Conditions. *Conditional*, in logic, is the same as hypothetical. But the difference indicated by either of the words, if it extends no further than to the form of a proposition, is purely grammatical; 168 (39, ad finem). For preliminary conditions of a dispute or discussion, see 139 (second note to Chap. III.)

Confirmation. The argumentative part of a regular oration; 10 (2).

Confutation. An occasional part of a regular oration; 10 (2).

Connotative. That which notes something, and, along with it, something more; 149 (foot-note). In our logic, all words are connotative: the distinction sought to be enforced by non-connotative will be sufficiently met by calling such a word as *John*, a term of single application; and such a word as *whiteness*, a term of double abstraction.

Consciousness. Error of the Sensationalists with regard to this part of our nature; 110 (first foot-note).

Consequence, Consequents. *A consequence*, in logic, is either an inference, or a conclusion. *Consequents*, the name of one of the topics of internal arguments 7 (II. 2); 157 (21).

Conviction, to Convince. The object of the rhetorician is *to convince*, as well as to instruct and delight:—*to persuade* implies all three of these, when, and in what proportion, needed. Logic enables us to convince *others*, by the practice of developing, for our *own* security and satisfaction, the means of conviction obtained by our studies generally in the several departments of learning; 1 (1–4); 140 (1).

Copula. The verb *is*, in Aristotelian logic; 218 (3).

Correlative. Terms are *correlative* which imply each other, as *father*, which implies *son* or *daughter;* and *son*, which implies *father* and *mother*. So likewise *king* and *subject*, *master* and *servant*, *cause* and *effect*, *antecedent* and *consequent*, are correlatives. But note, that the principle which such words make peculiarly and strikingly evident, is universally operative. We could not have the knowledge included in any word whatever, if we had not other knowledge which the word implies, though it does not directly express it. Thus we could not know what a man is, if we did not know what is not a man; and so with all things whatever; 163 (33).

Cross divisions. The error of confounding; 203 (14).

Datum, pl. Data. The *datum* is that which, in an argument, is *given* or conceded, and occurring in a syllogism, forms one of the two premises; 147 (10). It is one of the sources from which arguments derive their technical names; 3 (I. 1–7); 160 (25–32).

Decrementum. A species of sinking or bathos in style; 16 (12).

Deduction, Deductive. *Deduction* is the process by which knowledge is spread out before the understanding in words; 101 (2); 140–145 (1–6).

Definition. An important part of logic; its theory and practice; 129–140 (1–8, including the two notes). In attempting to develop know-

ledge, it is the first proof that can be given that we have the knowledge; 146 (8). A general topic of internal arguments; 6 (II. 1); 150–158 (13–21).
Deliberative. A term applied to the oratory of the senate, and of assemblies of the people; 2 (4). Subjects for exercise in; 82 (9, 10, 11).
Delivery. The fourth part of rhetoric; 3 (4); 56–59 (1–16).
Delusions of the rhetorical sophist. Cautions against; 121–129 (31–36).
Demonstrative. A term applied to oratory, so far as it embraces eulogy and instruction, when it is not proposed, for any immediate object, to move the will; 2 (4). Subjects for Exercise in; 82 (1–8). *Demonstrative*, in logic is said of argument which proceeds from admitted premises, to conclusions involved in those premises.
Descriptive, Description. *Descriptive*, in rhetoric, is comprehended under Narrative composition; 2 (4). *Description*, in logic, is called Accidental definition, 136 (7); 146 (8). Subjects for exercising learners in description; 74 (1–10).
Diasyrm. Another name for sarcasm, especially when applied with some degree of moderation; 20 (21).
Diction. The manner or style in which, as to his words and sentences, a person speaks or writes: it is the third part of rhetoric; 11–23 (1–24). Instruction and Exercises for improvement in; 26–55.
Dictum. Aristotle's *dictum*, the axiom of the formal syllogism, is referred to at 104 in the continuation of the note. See also 221 ("To a demonstration, an axiom," &c.)
Didactic. One of the general divisions of rhetorical composition; 2 (4).
Difference. A part in every real definition; 137 (8). It is always expressed by a grammatical or logical adjective, frequently, in the latter case, of very complicate construction; *ib.* (third foot-note). The difference, in an Accidental definition, may be carried out into a biography; 146 (8). Difference is one of the five Aristotelian predicables; 220 (4).
Dilemma. A description of syllogism whose peculiarity is not of a merely grammatical character; 169 (40).
Disposition. The art of arranging the arguments of a discourse. It is the second part of rhetoric; 10 (1, 2).
Disputation. Hints for ascertaining the reasonableness of a dispute or discussion, or of fixing its conditions; 139 (second note to Chap. III.)
Distribution. The meaning of the word *division*, in logic, explained by it; 132 (2, ad finem). The doctrine of distribution in Aristotelian logic; 221 ("Another necessary doctrine towards," &c.)
Division. See Distribution above. Division is also a term for one of the sub-parts of an oration; 10 (2).
Double abstraction. See 114 (15).
Douglas. Mr. James Douglas of Cavers alluded to, and quoted from; 152, 153 (foot-note); and 199 (foot-note).

Echo. A name sometimes used in place of other names of certain figures of speech; 14 (9); 17 (13).
Ecphonesis, Exclamation. A form of sentence in rhetoric; 13 (6).
Education. Specimens of faulty themes, and of a corrected one, on *Education;* 181, 182, 184.
Effect. One of the topics of internal arguments; 7 (II. 2); 155 (18).

Elenchus, Ignoratio elenchi. *Elenchus* (or *elench*), as a general term, means an argument, but, specially, the point or purpose which a course of argument keeps, or ought to keep in view. *Ignoratio elenchi* means the neglect to have such a point or purpose while arguing, or the neglect of keeping it steadily and clearly in view after having had it; 211–217 (18–22).

Elocution, Eloquence. *Elocution* means either Diction, or Delivery; 3 (foot-note). *Eloquence* is another form of the same word; but is commonly employed with a larger meaning, such as includes all the requisites of oratory.

Emotion. Rhetoric alone, of the three arts which teach the use of language, (Grammar and Logic being the other two,) concerns itself with our emotions; 1 (2); 101 (1).

Enantiosis. Antithesis or Opposition; a figure in rhetoric; 17 (14).

English History. Subjects for Narrative Exercises from; 71.

Enthymeme. A form of argument in which the datum is not expressed; 167 (37).

Enumeration. A topic of internal argument; 6 (II. 1); 151 (15). Also, a form of speech in rhetoric; 16 (12).

Epanalepsis. Epanaphora. Epanodos. } Modes of rhetorical verbal repetition; 17 (13).

Epanorthosis. Correction; an expedient in rhetoric; 21 (23).

Epiphora or Epistrophe. A mode of rhetorical verbal repetition; 17 (13).

Epizeuxis. A passionate repetition of words in rhetoric; 17 (13).

Erotesis. Interrogation, a form of sentence in rhetoric; 13 (5).

Essence, Essential. *Essence* is that (supposed something) which makes a thing what it is; 158 (22). Essential definition; 137 (8).

Etymological, Etymology. The *etymological* sense of a word; 119 (24). Etymology is one of the topics of internal arguments; 6 (II. 1) 150 (14).

Eulogy. A speech belonging to the class called Demonstrative; 2 (4). Outline for a Eulogy on a schoolboy; 82 (1).

Euphemism. A delicate way of saying what might otherwise give offence; 21 (22).

Examination questions. In Rhetoric, page 9: page 17: pages 22, 23: page 60. In logic, Introductory course, page 234.

Exclamation. See Ecphonesis.

Exergasia. A mode of rhetorical repetition by phrases of the same meaning; 17 (13).

Exordium. The Proemium or opening of an oration; 10 (2).

Experiment, Experience. *Experiment* is one of the two topics of externa. arguments; 6 (I.); 148 (12). *Experience* is the original source of all human knowledge; 155 (19).

Expression. In oratory, *expression* is the language of nature, mingling with, and giving soul to artificial language; 57 (8).

External arguments. These are employed in rhetoric when the auditors require instruction in what they do not yet know; 6 (1). Such arguments do not properly make a part of deductive logic, yet are usefully considered under it, because logic should be so studied as to prepare for rhetoric; 148 (12).

Extremes. The minor and major terms in the Aristotelian syllogism; 219 (4).

Fallacy, False, Falsity, Falsehood. *Fallacy* is a deceptive argument, which may not be *intended* to deceive. False means not true, either with, or without intention to deceive. A Falsity should mean what is false when there is no intention to deceive; but this meaning is not always adhered to. A Falsehood is, what is false when there *is* an intention to deceive; in which sense Falsity is also liable to be less properly used.

Familiar letters. Subjects for, 74–81.

Fancy. This is often used as a term synonymous with Imagination, but the best custom seems to warrant this difference: Imagination implies emotion as causing the presence of the conceptions, their character, combination, and sequence: (see Imagination:)—Fancy implies conceptions formed and continued voluntarily, that is, by choice, and without emotion. Fancy therefore is the origin of the *conceits*, as they are called, by which the school of poetry is distinguished which was prevalent in Italy at a certain period, and in our own country during the period which intervened between the Romantic school that closed about the end of Elizabeth's reign, and the Classical school that opened after the Restoration. The poets of that intervening school are called the *metaphysical* poets. Even Milton is often guilty of these *conceits*. Thus, in a sonnet which begins very naturally by saying that Shakspeare needs not a stone monument, he goes on with the conceit, that since we are all astonished by his genius, that is, turned into stone, we are all stone monuments to record his excellence; and in this manner, he *fancifully* makes out that any other monument is rendered unnecessary.

Figurative language, Figures of speech. See from page 12 to 22 (3–24). See an alphabetical Index, and the etymology of the names of the figures, page 24. Instruction and Exercise for the proper use of figurative language, pages 52–55 (Section 10, et seq.)

Figure of a Syllogism. The difference of the four figures of the Aristotelian syllogism explained; 223–225 (5, 6).

Flatness of style. Exercise for correcting; pages 30, 31.

Forensic. See Judicial.

Formal logic, Forms of an argument, Forms of language. The *Formal logic* of Aristotle objected to; 102 (Note); 122 (32); 133 (3); 142 (Note); 144 (foot-note), 167 (39). Some account of the syllogism of formal logic; 217–225 (2–6). Its principles opposed; 225–227 (7–11).

For *Forms of an Argument*, see 163–171 (33–41).

For certain *Forms of language* which are liable to produce error of thought, see 115 (16).

Fortitude. Example of a theme upon; 174.

French Speculative Philosophy. This subject alluded to; 106 (foot-note).

Friendship. Example of a theme upon; 185, *et seq.*

Function. Logical and Grammatical *function* distinguished; 101 (3); 144 (5).

General proposition. Such a proposition is often put forward by the rhetorician with a delusive purpose; 123 (33).
Generalization. A process carried on by means of a sign, which in logic is always a word; 120 (29).
Genus, Genera. For the purpose of clear comprehensive thought, we assemble things under kinds (*genera*); 130 (2, 3); 137 (8); 146 (8). *Genus* (kind) is one of the topics of internal argument; 6 (II. 1); 153 (16). It is one of the predicables of Aristotelian logic; 220 (4).
German Speculative philosophy. Remarks upon; 106 (foot-note); 111 (Note to Sect. 10); 117 (Note to Sect. 17).
Grammar. Distinguished from Rhetoric and Logic; 1 (1, 2); 101 (1); 144 (5, 6).
Grecian History. Subjects for Narrative Exercises from; 73.

Habit. Our acquiescence in the permanence of the natural course of things is moulded by habit; 152 (foot-note).
High style. Contrasted with the Colloquial and Middle style; 12 (2).
History of to-day. Example of a theme upon this subject; 65.
Homoioteleuton. One of the minor expedients of rhetoric; 19 (15).
Homonymous. *Homonymous* words are the same to the eye and ear, but different in meaning; as *bull*, a papal decree, and *bull*, the animal; in contradistinction to synonymous words, which are different to the eye and ear, but the same in meaning; as *angle* and *corner*. Paronymous words are either such as are nearly but not quite synonymous, or such as are grammatically allied to each other; for example, *logician* to *logic; firmness* to *firm; human* to *humanity*.
Hyperbaton. Transposition, when made for rhetorical effect; 15 (10).
Hyperbole. Rhetorical exaggeration; 21 (22).
Hypothesis, Hypothetical. Supposition, the state of mind under which knowledge is proposed, in order to be confirmed or set aside by experiment. A hypothetical proposition, when it is a mere *form* of *language*, takes its name from grammar; *our* logic is not, in this way, concerned with it; 168 (39, ad finem).
Hypotyposis. Vision, a figure in rhetoric; 22 (24).
Hysteron. A species of transposition in rhetoric; 15 (10).

Idea, Ideal, Idealism. *Idea* is a term liable to be so variously and vaguely applied, that, in a philosophical work, it is difficult to use it with safety. In Locke, it signifies what in this Manual is explained as the knowledge included under a word, whatever that word may be applied to signify. In many writings it means a conception, that is, the mental representation of some real thing, (see Conception), or what, in our doctrine, is called an *ideal* thing: it is often restricted to signify a *visual* ideal thing: —and lastly by the German Transcendentalists, it is used to signify what, in our doctrine, is called a thing metaphysical; *Idealism* is the doctrine of those who consider *ideas*, in this last mentioned sense, to exist originally in the mind; 106 (foot-note); 108 (9 and note); 109–112 (10 and note); 116 (17 and note).
Ignoratio elenchi. See Elenchus.
Image, Imagination. *Image*, in rhetoric, signifies the representation of something to the mind as an effect of emotion. *Imagination* is the

power or capacity to have emotions with such effects (compare Fancy, above). All the figures of speech, when in proper taste, spring from this power, and especially the more forcible; 22 (24); 52 (section 10).
Immortality. The Bible doctrine of the Immortality of man beyond the grave, and the Platonic doctrine of the Immortality of the soul, alluded to; 131 (foot-note).
Improvement in Style or Diction. The principle of such improvement as a part of Rhetoric, shown to differ from the improvement sought for in Grammar, and in Logic; 26 (Introduction).
Incrementum. A rhetorical ascent or gradation; 16 (12).
Induction, Inductive. *Induction* is the process of gathering knowledge; *Inductive logic*, that part of the art which teaches the use of words for this end; 101 (2); 104–111 (1–10). External arguments belong to Induction; 148 (12). Induction distinguished from Enumeration; 151, 152 (15).
Inference. A conclusion from premises in the inductive process; 107 ("In this process," &c.); 151 ("The argument from Enumeration," &c.); 154, 155 (17, 18).
Inflection. A slide or accent of the speaking voice; 57 (7).
Instinct. See Reason.
Intellection. The faculty of, (capacity for,) understanding: also, an act of the understanding, as a sensation is an act of the senses.
Interrogation. A form of sentence in rhetoric, otherwise called Erotesis; 13 (5).
Invention. The second part of Rhetoric; 3 (1).
Inward world. The same as ideal world; 108 (9).
Irony. A rhetorical figure in which, by our mode of delivery, we use terms of praise so as to signify the contrary; 20 (20).
Irrelevant premises. One of the modes of verbiage; 192 (10).
Is. This very abstract verb is called the copula, when employed to construct the syllogism of formal logic; 218 (3).
Judgement. Case in which we are properly said to use our *judgement*; 107 ("In this process," &c.). Judgement in Aristotelian logic is erroneously made a faculty of the mind, in contradistinction to Perception or Simple Apprehension, and Reasoning; 218 (3): 225 (8).
Judicial. A term applied to one of the three kinds of public speeches; 2 (4). Schoolboy cases for Judicial speeches; 84, 85.

Kant. His doctrine alluded to; 112 (note, ad finem); 117 (note to sect. 17); 135 (second foot-note).
Keeping the important point out of sight. A mode of rhetorical delusion; 126 (36).
Key to the Exercises for improving Style or Diction; 87–98. Key for correcting the sentences logically defective at pages 203, 204, and 206; 243.
Knowledge. Every separate word is the sign of knowledge, and all knowledge is in its nature abstract; 101 (3); 105–108 (2–9); 113 (12); 117 (18); 118 (21); 120 (28); 133 (3); 141 (2); 143 (4).

Language. Three arts, each having its own province, yet each assisting the others, join to render language perfect; 1 (1); 101 (1).
Letters. Subjects for familiar letters in writing rhetorical exercises; 74–81.

Literature. *Literature* may be said to grow out of a perfect use of language, such as Grammar, Logic, and Rhetoric teach. But Rhetoric is more immediately connected with Literature, with which indeed it is co-extensive; 2 (3, 4).

Litotes. A mode of rhetorical extenuation, otherwise called Meiosis; 21 (22).

Lively. One of the varieties of manner in delivery, arising out of certain emotive feelings; 58 (12); 59 (15).

Locke. *Locke* alluded to; 106 (foot-note). When logic shall be an art resting on a foundation universally admitted to be true, the merit of having turned inquiry concerning its nature and purpose, from the false direction into which Aristotle and his followers had led mankind, must be conceded, after Bacon, to John Locke, and to Horne Tooke. Yet both these men, in following out the well-conceived purpose of their respective inquiries, fell into egregious errors. Locke's purpose was, to inquire into the origin of human knowledge. This he pursues with too little regard to the moulding influence of language; and his distinction of Ideas into Simple and Complex, and these last into Modes, Substances, and Relations, are scarcely more than distinctions without a difference. On the other hand, Tooke attributes everything to language: he is a decided sensationalist, who, admitting Locke's foundation that our knowledge begins with sensation, admits nothing, except language, which is more than sensation; and while he argues justly against Locke's doctrine of Complex Ideas, sees nothing beyond the instrumentality of language in all beyond sensation. He hence concludes that *nouns* are the primary elements of language, and that *verbs* arose from nouns by the addition of something, which his Treatise ("Diversions of Purley") leaves unexplained. Horne Tooke was obliged to leave his speculation thus unfinished;—he had begun well, but he had taken a wrong turning. A course continued in the true direction, would have led him to the fact, that *verbs* are the primary language of our race,—are the speeches out of which, *nouns* are artificially evolved.

Logic. Logic discriminated from Grammar and Rhetoric; 1 (1, 2); 101 (1, 3); Aristotelian logic repudiated; 102 (note to chap. I.); Inductive Logic; 104 (1) Deductive Logic, 140 (1); the Aristotelian doctrine of logic explained, and then opposed by the Principles advanced in this Manual; 217–227 (1–11).

Major. An epithet applied to the term which is the predicate of the conclusion in the Aristotelian syllogism, 221 (4); and to the premise in which this major term is compared with the middle term, 222 (*ib.*). This premise is, in our logic, called the *datum*.

Materialism, Matter. These subjects alluded to; 131 ("There is an old division," &c. and foot-note).

Meditative. One of the varieties of manner in delivery, arising out of certain circumstances attending the speaker; 58 (11).

Meiosis. A mode of rhetorical extenuation, otherwise called Litotes; 21 (22).

Memory. *Memory* is conception, accompanied by the knowledge of time past, relatively to the actual present. But the term is often applied

to the readiness of reviving a whole series of mental acts, by reviving any one link of the series.

Metalepsis. A complicated metaphor; 20 (19).

Metaphor. A turn of a word from its proper application, so as to include a simile; 19 (17).

Metaphysical, Metaphysics. *Metaphysical* means the same as Transcendental, that is, transcending nature. *Metaphysics* are all those parts of learning which keep real and ideal (in one word, physical) things out of sight, or, at least only so far in sight as the weakness of the understanding may require; 109 (10, and note); 114–117 (15–17, and note); 118 (20, 21).

Method. *Method*, in many works on logic, follows Perception (or Simple Apprehension), Judgement, and Reasoning, as the fourth part of the art. As the first three distinctions are built on wrong grounds, so the fourth may be objected to, because it belongs to rhetoric much more than to logic:—See page 211, ("* It belongs to rhetoric," &c.) So far as *our* pupil in logic can be assisted with respect to Method in his essays to develop his knowledge, he will find appropriate instruction in Chapter V., from page 211, extending from Section 18 to the end of the Chapter.

Metonymy. A rhetorical use of one name for another; 19 (18).

Middle Style. Contrasted with the Colloquial and High Style; 12 (2).

Middle Term. That term in the formal syllogism with which the major and minor terms are separately compared; 219 (4); 222 (*ib.*)

Mill. Allusion to the doctrine of Mr. James Mill; 110 (first foot-note); —of Mr. John Stuart Mill; 120 (30, foot-note); 149 (foot-note).

Mimesis. Mimicry, or the sarcastic imitation of another's manner; 20 (21).

Mind. This subject alluded to; 131 (2, "There is an old division," &c., and foot-note).

Minor. An epithet applied to the term which is the subject of the conclusion in the Aristotelian syllogism; 221 (4); and to the premise in which the minor term is compared with the middle term; 222 (*ib.*) This premise, in our logic, is called the *argument* or *reason*.

Mode or Mood of a Syllogism. The difference in an Aristotelian syllogism, which is determined by the quality (affirmative or negative) and the quantity (universal or particular) of its premises; 223 (5).

Modulation. The management of the accents and the key of the voice in delivery; 57 (7).

Moral. As a term in logic, this word means *customary*, or having all the force which can be derived from custom. In this sense it is opposed to metaphysical. Thus, it is *morally* certain that we shall have thunder when the weather becomes very hot; it is *metaphysically* certain that the angles of every triangle are equal to two right angles.

Mutatis mutandis. Those things being changed, which the changed circumstances require; a Latin phrase often used in argument; 160 (24).

Names. These are proper, common, or abstract; 118 (20). Names of Arguments from three sources; 147 (11).

Narration, Narratives. The *Narrative* is one of the three kinds of Composition in rhetoric; 2 (4). The term is also applied to one of the

varieties of manner in delivery; 58 (9). Specimens of Narratives; 65, 67. Subjects for Narratives; 71–74.

Necessary. This term is properly applied to knowledge which is a part of some knowledge that includes it; 147 (10); 148 (12); 154, 155 (17–19); 164 (34).

Negation, Negative. See Affirmation. See also, No, Not.

Nerves. These, as they connect the organs of sense with the brain, seem, in the absence of the things of sense, to originate the ideal world; 108 (9).

No, Not. *No* or *Not* is an important element in the construction of the Aristotelian syllogism, but is viewed, in *our* logic, as a mere grammatical particle of no more logical importance than other grammatical parts of speech, 168 (39, "In our logic, again," &c.); 218 (3); 226 (9).

Nominal, Nominalist. A definition is called *nominal* when it does not explain the thing;—in contradistinction to a real one, which in some way does so; 134 (5). A *Nominalist* is one of a logical sect that, throughout the middle ages, opposed the Realists. (See in this Index Scholastic, Schoolmen.) The Realists maintained that universals correspond to *real* substantive ideas existing in the mind; while the Nomalists affirmed that they are *names* only; (viz., such names as, in this Manual, are called Common and Abstract.) The dispute in the old shape is now at rest, though in a new shape it still in some degree remains. Thus in a new shape we, in this Manual, are Nominalists, so far as we oppose the doctrine of original ideas, and the Idealists are Realists, so far as they maintain this doctrine. See 106–112 (6–10, and note).

Not. See No, above.

Not-being, Nothing. These words alluded to; 130 (2, and foot-note).

Notion. *Notion* may mean the knowing or knowledge of something. Having this sense, it is better to say of any single word that it is the sign of a *notion*, than that it is the sign of an *idea*. See Idea, above.

Object, Objective. These terms, as contradistinguished in modern philosophical use to Subject, Subjective, are alluded to; 137 (first foot-note); 175 (46).

Observation. Theme upon; 173.

Onomatopœia. The coining of a word from some natural sound; 19 (15).

Operations of the mind. These, which are said to be three in Aristotelian logic, are maintained to be but one in ours; 225 (8).

Opinion. This is a judgement or inference from limited facts, and therefore in different degrees, a real non-sequitur that awaits further facts.

Oration, Oratory. An *oration* is a speech: Oratory the art of speaking,—a term commonly used with a less comprehensive meaning than Rhetoric, which includes all that conduces both to good speaking, and good writing; 1, 2 (1, 2, 3, 4). An example of a school-boy's oration to his master; 69.

Outward. Objective; terms which, in the doctrine of logic, are applied to anything that is not already included in the mind. See Objective.

Oxymoron. In rhetoric, a saying which, though foolish if taken plainly, means a great deal; 18 (14).

Parade of logical forms. Caution against the delusion of such forms; 122 (32).
Paradiastole. In rhetoric, a peculiar sort of antithesis; 18 (14).
Paraleipsis. The same in rhetoric as *apophasis*, or omission; 21 (23).
Paralogy. False reasoning.
Paraphrase. The development in many words of what is, or may be expressed briefly. Its propriety can be justified only by its necessity. For an exercise to correct it when faulty, see page 32.
Parathesis. In rhetoric, the brief parenthetical notice of something, on which the speaker intends to enlarge when he has dispatched what is immediately in view.
Paregmenon. In rhetoric, a sort of antithesis; 18 (14).
Parenthesis. The insertion of a sentence within a sentence; 14 (8). Exercise including sentences requiring parenthesis; 45.
Paroemia. In rhetoric, an allusion to a proverb; 20 (19).
Paronomasia. A pun; 18 (14).
Paronymous. See Homonymous.
Particular proposition. This in logic is opposed to a *universal* proposition; 223 (5).
Parts of speech. In what way logic is concerned with what are called so in grammar; 144, 145 (5, 6).
Pathetic. One of the general divisions of rhetorical composition; 2 (4).
Pedantic style. Exercise for correcting it; 32.
Pen. Its proper use in rhetoric; 2 (3).
Perception. The knowledge or recognition of an object through the senses; in other words, a sensation accompanied by a revival of acquired knowledge. Compare Conception and Sensation.—The division of Man into Mind and Matter (see page 131) has always been the source of infinite perplexity, when philosophers have attempted to explain how perception takes place. The difficulty remained to recent times, till the Scottish philosophers cut the knot, in utter hopelessness to solve it. What it was before their time, I shall quote from the Sequel to Sematology to show. "How the mind could have cognizance of matter, was with the Greeks a question in very early times. Shut up, as they assumed it to be, like a light in a dark lantern, how did it become acquainted with the things out of the body? It was agreed on all hands that the mind could operate only where it was present; and how could it be present to the things of the material universe? In answer to this query, some asserted that the mind walked out of the body in order to take cognizance of the things of sense; while another set asserted that it did not walk out of the body, and consequently that it did not perceive the things of sense at all, but only the species, images, or ideas of them. This was explained by assuming that all material things dispersed from themselves filmy or shadowy representations, which, being received by the senses, were by them transmitted to the mind, which treasured them up; and that, with regard to most of them, the mind, by its peculiar chemistry, sublimated the particular into general ideas. The difficulty was met in later times by Leibnitz, with a theory still more fanciful. He taught that the soul and the body could have nothing to do with each other, being sub-

stances altogether different; and that the correspondence of their actions arose from this,—that the Creator had pre-ordained a perpetual similarity of action between them, so that whatever one did, however different in nature from what was done by the other, was nevertheless accompanied by a correspondent act, the soul and the body always chiming together with unfailing exactitude."

Period. A sentence whose parts are grammatically dependent to the end; 14 (7). Exercise for the construction of periods, with preliminary instruction; 33–38 (sect 4 et seq.)

Periphrase. A circumlocution,—a roundabout expression.

Peroration. The concluding division of a regular oration; 10, 11 (2).

Persuade. To *persuade* is the object of the rhetorician; but to accomplish this, he must be able to instruct, to convince, and to delight; 1 (1, 2, and foot-notes). See also Conviction above.

Personal subjects for exercise in rhetoric; 71.

Petitio principii. Various forms of this logical error; 188–191 (6–9).

Philosophy, Philosophers. These are connected with Logic, because if *Philosophers* go astray, there must be something wrong in their means or purpose, while trying to come at the *wisdom* which they profess to *love*. But in a *Manual* of Logic, an examination of past and present philosophy, with a view to test, by its rules, what is sound or what is unsound in means or purpose, will at once appear an impossible undertaking. In place of such an examination where it would properly come in the body of a larger book, it is proposed, in this Index, to furnish, nearly in chronological order, the names of certain leaders of sects, especially those of Greece, accompanied by slight notices of the perpetual opposition of opinion by which the sects were multiplied and kept distinct.

THA'LES, the earliest Grecian philosopher of distinguished name, is supposed to have flourished nearly seven centuries before the Christian era. He was a native of Mile'tus in Io'nia; and because Anaximan'der, Anaxim'enes, Diog'enes of Apollo'nia, (who must be distinguished from Diogenes the Cynic,) and Archela'us, were either taught by him, or were also natives of Ionia, they are all included in what is called the Io'nian or Ion'ic school, although they did not all profess the same speculative opinions. In this they coincided, that the universe springs from some one material; but whether from water as Thales taught, or from air as others insisted; whether it was palpable and finite, or imperceptible and infinite, they were not agreed.

PYTHAG'ORAS, a native of the isle of Sa'mos not far from Ionia, is supposed to have flourished a little less than six centuries before the Christian era, though some make him contemporary with Thales. He taught that number was the essence and principle of all things, deemed the souls of men to be emanations of the divine substance, and joined to this doctrine that of the transmigration of souls. He founded his school at Crotona in Italy, and hence it is called the Italian, though sometimes the Doric school.

XENOPH'A-NES of Col'ophon, contemporaneously with Pythagoras, also founded in Italy, namely at the town of E'lea, a school, hence called the Eleat'ic, which changed the emanative system of the

Italian school for the doctrine of one eternal infinite being, identical with the universe; a doctrine now called pantheism. The other most eminent men of this sect were Parmen'i-des and Ze'no. The date of this last philosopher, who must be distinguished from Zeno, the founder of the Stoics, is about four centuries and a half before the Christian era.

HERACLI'TUS of Eph'esus also flourished, as is supposed, about four centuries and a half before the Christian era. Though he properly belongs to the Italian school, yet he so far thought for himself, as in general to be distinguished individually. He deemed the one pervading principle of the universe to be fire, but not the elemental fire or flame, for this he held to be the excess of fire:—it is, according to him, a warm dry vapour; and this is the same as vital energy or the soul.

LEUCIP'PUS, the disciple of Zeno the Eleatic (see above), and the teacher of Democ'ritus, was the founder of what is sometimes termed the lower Eleatic school. He discarded the transcendental universe of the elder Eleatics, and placed the foundation of his theory in the world of the senses. He is regarded as the original propounder of the Atom'ic doctrine, afterwards taken up by the Epicure'ans. Democritus was his disciple with some degree of dissent from his master, by a less exclusive adherence to what we at present call sensational philosophy. Democ'ritus has been called the laughing philosopher, because he inculcated cheerfulness as the main end of our pursuits, while the melancholy Heracli'tus is often spoken of as the crying philosopher. Protag'oras was the disciple of Democritus, and made himself remarkable by his maxim, that man is the measure of all things.

SOC'RATES, the philosopher rather of practical morals, than of speculative opinions which propose to include morals in wider doctrines, was born at Athens 468 B.C., and put to death 399 B.C. Laying aside the problems concerning the origin and nature of the universe, and how and why man exists as a part of it, the object of his instruction was to make men good, as the only way to make them happy.—As to his mode of teaching, see Socratic in this Index. A host of disciples succeeded; but some exaggerated and some corrupted his doctrines. Ce'bes, indeed, in his Picture of Human Life, conveys the doctrine of his master with beauty and truth, although there is a slight colouring borrowed from Pythagoras. Xen'ophon acted up to his master's principles, and in that way demonstrated their value. Diog'enes, the founder of the Cyn'ics (men who lived like *dogs* and snarled like them,) exaggerated his tenets and his manners. To another of his disciples we must give a distinct place, namely to

PLA'TO. The immortal sage who bears this name was born at Athens 429 B.C., and died B.C. 347. He is the founder of the Academ'ic school, an epithet derived from the grove of Acade'mus, in which he lectured. Instructed in all philosophy that preceded him, he taught what best harmonized with his own capacious and comprehensive mind. His leading doctrine is the independence of God or spirit, and Matter, as the two distinct eternal principles by which

all things exist, the one operating formatively on the other, but not creatively. Our impressions of outward objects are the produce of ideas and matter, the ideas of the human soul being copies of exemplars that reside in the divine mind; and these divine exemplars are more and more remembered by man, the more he sees of their imperfect copies without. Hence, the striving of the well-taught soul to reach perfection.—See at Plato in this Index, references to allusions in the Manual.

AR'ISTOTLE, who was born at Stagi'ra in Mesopotamia, B.C. 384, and died 322, was for twenty years the disciple of Plato, but he at length divided from his master, and became the head of the Peripatet'ics, who were so called from the place in the Lyce'um, where they *walked* and discoursed. Among the points on which Aristotle differed from his master, one was his theory of ideas. Aristotle taught that ideas are the phantasms of things, and not the eternal intellectual types, which in Plato's doctrine give form to the things of sense:—See at Aristotle in this Index, references to parts in the Manual where his Logic is considered. See also Scholastic, Schoolmen.

ZE'NO, who must be distinguished from Zeno the Eleatic (see above), was the disciple of Pol'emo, an Academic; but he divided from his school, and became the founder of the Stoic philosophy. He was born in Cyprus, in some year between 357 and 352 B.C. and died in some year between 263 and 259 B.C. He taught at Athens in a place called the Porch or Portico, (Stoa,) whence the name of the Sect. To him must be attributed a sound division of all learning into Physics, Ethics, and what may be called Semeiotics, which latter department includes the Trivium,—Grammar, Logic, and Rhetoric. It was for its ethics that the Stoical philosophy was remarkable. A wise man, it taught, is unmoved by joy, grief, or other passion, esteeming all things as governed by an unavoidable necessity. In physics, it taught that the universe consists of cause and of matter. Death is the separation of the soul and body, but they are both material, and the former, though it continues after death, is perishable. The soul of all things is indeed imperishable, and of that soul all that has life, is part.—Among the great men that, in subsequent times, were of this sect, may be mentioned Ca'to of Utica, (ob. 46 B.C.,) Sen'eca, the Roman tragic poet, (ob. A.D. 65,) Marcus Aurelius, the emperor, (ob. A.D. 180,) and Epicte'tus, the Phrygian, the time of whose death is uncertain, but he is known to have lived into the times of the last-mentioned emperor.

EPICU'RUS taught at Athens while that city was thronged with Academics, Cynics, Peripatetics and Stoics, in all the vigour of recent institution. He died 270 B.C. His philosophy contrasts, in morals, most strongly with that of the Stoics. He made the senses the test of truth, and prudence the chief of virtues, because it restrains the appetite for pleasure only so far as indulgence would be hurtful to it. He maintained the atomic philosophy in physics, or that which attributes the universe to the confluence of atoms, that, being endued with gravity and motion, formed all the things of sense without the aid of a supreme intelligent power.

PYR'RHO is the best known of philosophers who bore the name of

Sceptics or doubters. He flourished about three hundred years before the Christian era at Elis in the Peloponne'sus. When the Stoics divided from the Academy, the remaining disciples of this school set themselves in opposition to the Stoics, and Scepticism was the effect, or the practice of controverting whatever was attempted to be taught as truth:—in fact the aim of the sceptical philosophy was to maintain the incomprehensibility of all subjects, and their art was the ability to speak with equal plausibility on both sides of every question. The school is called the New Academy, which further divided into the Second, Third and Fourth Academy.

In passing from philosophy and philosophers of ancient days to those of comparatively modern times, it will scarcely be fitting, in this Manual, to mention much more than the names of some philosophers, who led the way for speculation as it exists in our days. Something concerning modern speculators has already been offered:—see the references in this Index to Sensationalism and Idealism:—and for the peculiar character of all learning during the dark and middle ages, see in this Index Scholastic, Schoolmen. In Italy, Cardan, Bruno, and Campanella, who flourished from about the middle of the sixteenth to the beginning of the seventeenth century, opposed their own ways of thinking on the universe, the Deity, and the destinies of man, to the prevalent religious doctrines. The latter two met the then fate of heretics; a fate which entitles them to a respect which their opinions would scarcely claim; since these were nothing more than revivals, or mixtures, or modifications of the doctrines of the ancients. Descartes (ob. 1650) was the first of modern speculative philosophers, that, casting off the authority of the ancients, determined to think for himself. His philosophy, however, in the hands of his followers soon passed nearly into the old channels; Spinosa (ob. 1677) and Malebranche (ob. 1715) being both of them pantheists, the former material, with the Eleatics of old; the latter spiritual, with the Stoics and Pythagoreans. Hobbes, the philosopher of Malmsbury in Wiltshire, flourished about the same time as Des Cartes, and published bold opinions, that militated against religious motives of action, in a work called Leviathan. Leibnitz, a German, was also a contemporary; and his speculations, while they were more ingenious, were less offensive to the religious world. He is mentioned here on account of his doctrine relating to spirit and matter. (See Perception in this Index.) Hume was an English philosopher of the last century, whose doctrine threatened to undermine our reliance both on secondary causes, and on a First Great Cause. He has been met by many antagonists since his time, and among them by Dr. Brown, one of the Scottish School, whose Inquiry into the relation of Cause and Effect might be far more triumphant than it is; for "it is vitiated," says Sir John Herschell, "by one enormous oversight,—the omission, namely of a distinct and immediate personal consciousness of causation in his enumeration of the sequence of events by which volition is made to terminate in the motion of external objects." It is by observations like this last, which trace our highest knowledge from our first and firmest experience, that truth is more effectually served than by whatever specu-

lative opinions, if they have no other foundation than the busy agitation of the human brain.

Physical. Natural, including *real* and *ideal*, in contradistinction to *Metaphysical*, or transcending the real, and *ideal;* that is, the ideal which is a transcript or a combination of the real; 109 (10); 118 (12); 131 (2).

Physico-logical. An essential definition of a thing-physical is so called; 137 (8).

Plain. Style or diction so called in contradistinction to figurative; 12 (3). A delusion from confounding this sense of the word with another; 124 (34).

Plaintive. One of the varieties of manner in delivery, arising out of certain emotive feelings; 59 (14).

Plato. The doctrines of this philosopher alluded to; 109 (Note to Sect. 9); 111 (Note to Sect 10); 131 (foot-note). See also Philosophy, Philosophers in this Index.

Pleonasm. Rhetorical redundancy; 17 (13).

Ploce. A peculiar figure of speech in using a proper name; 18 (14).

Polyptoton. A sort of antithesis in rhetoric; 18 (14).

Polysyndeton. A way of prolonging an enumeration in rhetoric; 16 (12).

Positive. *Placed*, set, appointed: to this meaning *negative* may be opposed, and in the sense requiring such opposition, the word *negative* has in our system a logical value: not so when opposed to affirmative; see No, Not: see also Affirmative.

Practical, Practice. *Practical* directions concerning Inductive Logic, 113–129 (11–36): Concerning Definition; 134–140 (4–8, and Notes): Concerning Deductive logic; 145–179 (7–45): Concerning Errors in deductive *practice;* 180–217 (1–22).

Predicables. What they are in formal logic; } 220 (4).
Predicaments. What they are in formal logic; }

Preliminary conditions. The necessity of such conditions on proposing a dispute or discussion; 139 (second Note to Chap. III.)

Prolepsis. *Anticipation*, a rhetorical expedient: 21 (23).

Premises. What they are in our logic; 101 (1); 141 (2); 147 (10). What they are in formal logic; 222 ("When we have to show," &c.)

Pronunciation. The limited or special meaning of this term in modern tuition; 56 (5).

Proper names. This is a logical distinction, though commonly borrowed by grammar; 118 (22).

Property. *Property* distinguished from Accident; 136 (7); 158 (22). It is one of the five predicables in Aristotelian logic: 220 (4).

Proposition. In rhetoric, one of the occasional divisions of a regular oration; 10 (2). In logic, a *proposition* is a sentence which develops knowledge in a greater or less degree, and in *our* logic considered to be a virtual syllogism; 145 (6);—in Aristotelian logic, considered to be the enunciation of a *judgement*, and hence distinguished from *reasoning* as expressed by the syllogism; 218 (3); 223 (5).

Prose. A purely logical exercise must be in *prose:*—rhetoric employs prose for its ordinary productions; but since it includes poetry, it also includes *verse;* 2 (4).

Proximum genus. The genus immediately next above the subject of defi-

nition, to which genus we have to add the specific difference, and the subject is defined; 132 (2).
Purely logical. An essential definition of a thing metaphysical is so called; 137 (8).

Quaintness of style. Instruction and Exercise for correcting it; 27, et seq.
Quality and Quantity of Propositions. These are distinctions in Aristotelian logic, the former of which our logic resigns to grammar, admitting only the latter; 221 ("Then we have a difference," &c.), and 223 (5).
Questions for discussion. Outlines for school speeches; 82 (9–11). Absurdity of some such questions; 139 (second note to Chap. III.)

Real. *Real* things in contradistinction to *ideal;* 108 (9); 117 (18); 131 (2). A *real* definition in contradistinction to a nominal one; where, it must be remembered, the epithet is used with a less strict application; 135 (6).
Realist. See Nominalist.
Reason. *Reason*, in a special sense, means the same as Argument; which see. As the name of that capacity in man which distinguishes him from brutes, we may say, that it is the capacity to use signs of knowledge gained, in order to accumulate further knowledge; and to use the same signs in order to develop the knowledge accumulated. Briefly, man is a creature capable of language,—to use the Homeric epithet, a *voice-dividing* creature, that is, one who divides a natural cry into *parts of speech*. Be it observed that the born-deaf, and consequently dumb, have the mental capacity, though they want the exterior organ for language. We may again, in other words, say, that Reason is the power of abstraction. Brutes have knowledge with their sensations, but *their* knowledge is never abstract, that is, cannot be entertained apart from their sensations: this is Instinct; and this its true difference from Reason.
Relation. *Relation*, in Aristotelian logic, and even in Locke's Essay, is a distinct general head, set in contradistinction to other general heads under which the subjects of thought are accumulated. In *our* logic, it is *that* in which all knowledge has its origin and its existence: that is to say, in our logic, to know anything is to be aware of its relation to some other thing or things, and the relation of all these things to oneself.
Repetition. Rhetorical figures of *repetition;* 17 (13).
Rhetoric. *Rhetoric* distinguished from Grammar and Logic; 1 (1, 2); 101 (1).
Roman history. Subjects for Narrative Exercises from; 72.

Sarcasm. A figure in rhetoric that derives its force from the speaker's manner; 20 (21).
Scepticism. See Philosophy, Philosophers, above. All speculative philosophy, that is, philosophy (if so it must be called) which builds on hypothetical grounds, must, through its very character, terminate in scepticism.

Science. Strictly, that which can be demonstrated from self-evident truths; and as such demonstration is impossible in physics, we must look for it, strictly, in metaphysics alone; 109 (10).

Scholastic, Schoolmen. *Scholastic* learning and the *Schoolmen* alluded to; 134 (3). The father of the Schoolmen was John Scotus Erigena, a native of Ireland, who lived in the ninth century, and first introduced, from what source is unknown, the philosophy of Aristotle. Though at first opposed, it was soon adopted by churchmen as a scientific basis of the doctrines they taught, and it continued to be mixed with divinity and all other learning during full five centuries, in which time, however, we may trace certain eras and changes. A new era commenced with the rise of the Nominalists (see Nominalist) under John Roscelin, a Frenchman, who flourished in the twelfth century. The celebrated Abelard was his disciple. The third period saw the introduction into Europe of the writings of the Arabian philosophers, the translation of Aristotle from different versions into Latin, his undisputed predominancy in all the schools, and the complete triumph of Realism. It is at this time, namely, in the thirteenth century, that we have the great names among the schoolmen, such as Albertus Magnus, Thomas Aquinas, and Duns Scotus; the latter two of whom had their sects distinguished by the names of Thomists and Scotists. In reaching the days of William of Ockam, who died in 1374, we attain another era. His mind, better constituted or better taught, threw off much that was trifling, and more that was erroneous, in the prevalent learning; and in a little more than a century from his time, we begin to lose the distinctive features which the term scholastic is intended to signify when applied to literature.

Second intention. A term in formal logic to signify what in our logic is called a special meaning; 120 (26).

Sensation, Sensationalism, Sense. A *sensation* in itself is nothing more than a state of one's animal being; it is not perception till knowledge is joined to it. *Sensationalism* is the doctrine of those who think that knowledge begins by being sensation. A *sense* is the organ through which a sensation is received; 106 (6, and foot-note); 109 (note to Sect. 9); 110 (first foot-note); 111 (note to Sect. 10). The sense of any single word is the knowledge which it signifies; of two or more words is the development of knowledge; 101 (1, 2); 143 (4).

Sentiment. This term, though etymologically allied to the preceding, deviates from them in meaning, at least when the former are strictly applied. It includes knowledge, and emotion joined to knowledge; and is connected in meaning with the word *sense* only when the latter is loosely applied, so as to imply both sensation and thought; as in saying "He has a grateful *sense* of your kind acts."

Shifting senses of a word. Caution against the delusion hence arising; 124 (34).

Simile, Similitude. This is a figure in rhetoric; and also one of the topics of internal argument both in rhetoric and logic; 8 (II. 3); 19 (16); 159 (23).

Slides of the voice. The tones that form the modulation of speech; 57 (7).

Socratic. The *Socratic* method of reasoning, consisted in so putting ques-

tions, that the respondent, by his admissions, was led, step by step, to yield the conclusion in view. *Socrates*, see Philosophy, Philosophers.
Solemn. One of the varieties of manner in delivery, arising out of certain emotive feelings; 59 (16).
Sophistry. Suggestions for avoiding the delusions it creates, during the inductive process of learning; 121–129 (31–36).
Sorites. A form of language arising from an accumulation of arguments; 167 (38).
Special, Specialize, Specialization, Species. *Special* means, singled out by particular characteristics from the genus or kind to which the thing belongs; *Specialize* is to make special by reduction from a general application. *Species* means a *sort* under a kind or genus; 6 (II. 1); 120 (26); *ib.* (30); 137 (8); 146 (8); 153 (16).
Spiritualism. In speculative philosophy, this word signifies the doctrine that all which exists to the understanding is spirit or mind; a conclusion inevitable if we admit the doctrine of ideas as taught of old, or even as expounded by Locke. For if the mind is cognizant only of ideas, it is as much as to say, that the other presumed substance, namely matter, exists not to the mind, ideas being of the nature of the mind itself. Berkeley's theory is, in fact, incontrovertible while we adhere to the distinction between *mind* and *matter*, and the doctrine of *ideas* in connection with that distinction.
State of the case. One of the divisions of a judicial oration; 10 (2).
Stewart. *Dugald Stewart* alluded to; 104 (in the note to Chap. I.); 156 (foot-note); 219 (foot-note).
Style. Colloquial, Middle, and High *Style* exemplified; 12 (2). Instruction and Exercises for improvement in style; 26–55.
Subaltern genus. That which is a species with respect to some higher genus; also that which has only species immediately under it; 132 (2).
Subject, Subjective. See Object, Objective.
Subject-matter. Where there is no subject-matter to be understood, there can be nothing understood. Hence, a monstrous absurdity in the doctrine of the formal syllogism; 142 (note to Sect. 2, ad finem.)
Summum genus; *pl.* Summa genera. The highest genus; 130 (2). The *summa genera* of Aristotelian logic; 220 (4).
Syllogism. The syllogism virtually exists in every form of speech developing thought by two or more words. The name, however, is strictly given only to the form consisting of three propositions, the first and second being premises, out of which a necessary truth arises, which is expressed by a third preposition called the conclusion; 101 (1); 141, 142 (2 and note); 163–167 (33–36).
The syllogism of formal logic. 217–225 (1–6).
Symploce. A mode of repetition in rhetoric; 17 (13).
Synathrœsmus. Accumulation, a figure in rhetoric; 16 (12).
Syncategorematic. See Category, Categorematic.
Synchoresis. Concession, one of the expedients of rhetoric; 21 (23).
Synecdoche. Comprehension, a figure in rhetoric; 19 (18).
Synepy. The complete union in delivery of words that join to make sense; 57 (6).
Synœceiosis. A sort of antithesis in rhetoric; 18 (14).

Synonymous, Synonymy. *Synonymous* words are those that differ in spelling and sound, but are the same in meaning; as *periphery* and *circumference*: compare Homonymous. *Synonymy* in rhetoric is one of the figures of repetition; 17 (13).
Synthesis. See Analysis.

Tactual impressions. These are probably the early inlet of all our fundamental knowledge; 109 (note to Sec. 9).
Tapinosis. A method of rhetorical extenuation; 21 (22).
Technical language. Though in the *argumentum ad doctrinam* technical language is justifiable, it ought not to be used in ordinary cases; 4 (3); 27 (Sect 1, and examples at bottom of page 28 and top of page 29).
Testimony. This is one of the topics of external arguments; 6 (I.); 148 (12).
Themes. *Themes* are an admirable means of bringing a learner to a consciousness of his deficiencies in the inductive process of logic: the word theme has two meanings; examples of themes; 113 (11); 171 (43); 173, 174 (45); 184 (3); 185 (4). Outlines for themes; 229.
Thesis. A *Thesis* is a theme given out in the form of a proposition; 177–179 (47).
Thing. This is a term includiug every possible subject of thought, except Nothing or Not-being; 130 (2). In this Manual, *things* are distributed into things-physical and things-metaphysical; and the former into things-real and things-ideal; 131 (2). *Nothing* or *Not-being* is a thing-metaphysical.
Thinking. That conscious state in which things present themselves really, or ideally, or in part really, in part ideally, either under familiar relations or under new relations to each other and to the thinker; 141 (2). One of the effects of thinking described; 212 (18).
Tooke. For an allusion to Horne Tooke's doctrines, see Locke above.
Topic. *Topics* are so called, as being the *places*, where arguments are to be found; 5-9 (II. 1,—II. 3); 148–160 (12–24).
Transposition. Examples of rhetorical transposition; 15 (10). Also of sentences whose parts require redistribution; 38–42 (Sect. 5).
Triads of propositions. The number of these that can be made up out of the Aristotelian extremes and middle term, joined by *is* and *is not*; 223 ("Now disregarding," &c.), and 224 ("And as, in the first," &c.)
Trope. A *trope* is distinguished, by some teachers, from a *figure* of speech; 12 (3, and foot-note); 19 (16).
Trust not appearances. Example of a thesis on this subject; 177–179 (47).
Truth. *Truth* is knowledge that is held with certainty. But what is truth to one individual mind, may not be truth to others. Hence, we often justly speak of truth as something independent of the mind, namely as knowledge yet to be reached, and even as knowledge beyond all present reach.

Vehement. One of the varieties of manner in delivery, arising out of certain emotive feelings; 59 (13).
Verb or Word. The verb or word is never logically complete, till all is expressed by it which we intend to develop; 144 (5).

Verbiage. Varieties of error under this name exemplified; 180 (2); 188–204 (6–14).
Vowel sound. What a *vowel-sound* is; 56 (3).

Universal. A *universal* proposition stands opposed, both in Aristotelian, and in *our* logic, to a *particular* proposition; 221 ("Then we have a difference," &c.), and 223 (5).

Wedgwood. *Mr. H. Wedgwood* alluded to; 109 (note to Sect. 9).
Whately. *Dr. Whately* alluded to; 102–104 (note to Chap. I.); 110 (second foot-note); 116 (foot-note); 122, 123 (32, and foot-notes); 124, 125 (34); 134 (4, and foot-note); 138 (first foot-note to Chap. III.); 142 (note to Sect. 2); 144 (foot-note); 191 (9); 193, 194 (9, continued); 197 ("Hence it is matter of complaints," &c.); 219 (foot-note); 226 (foot-note).
Whewell. *Dr. Whewell* alluded to; 111 (note, sect. 10); 156, 157 (foot-note).
Will. The impulse of desire, accompanied by the knowledge, that what we desire we have the power to compass.

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A GUIDE TO SYLLOGISM,

OR,

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AN ACCOUNT OF THE MANNER OF DISPUTATION NOW PRACTISED IN THE SCHOOLS AT CAMBRIDGE;

WITH SPECIMENS OF THE DIFFERENT ACTS.

ADAPTED TO THE USE OF

THE HIGHER FORMS IN GRAMMAR SCHOOLS, AND OF JUNIOR STUDENTS AT THE UNIVERSITY.

BY

THE REV. CHARLES WESLEY, B.D.

Late of Christ's College, Cambridge.

"A Syllogism is a form of reasoning which serves to compress much matter into a little compass, and helps to investigate truth with certainty."—*Bishop Watson.*

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M.DCCC.XXXII.

INTRODUCTION.

THE object of the compiler, in arranging these pages, is to lead the student, by the shortest path, to an acquaintance with the more interesting and practical parts of Logic. It appears to him, that there are many persons who would decline the perusal of a treatise on *Apprehension*, the *Divisions of Nouns*, and the different sorts of *Predicables*, who might be interested in examining the nature of Propositions, and the principle on which an Inference is conclusively drawn.

He is confirmed in this opinion, by having often observed, that youths of an ingenious and intellectual turn, disinclined as they might be to undertake the perusal of a bulky volume upon Logic, are generally gratified when an argument is set before them, in the brief and lucid form of a Syllogism.

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The Appendix contains a summary account of the manner of syllogizing in the schools at Cambridge; and it is hoped that younger disputants, who are about to appear there, may derive some advantage from the following pages.

To the Regii Professors in Divinity, Law, and Physic, and to the Rev. Dr. Graham, Master of Christ's College, Cambridge, the compiler has to offer his most grateful thanks for the numerous obligations under which they have laid him.

He has the honour also to confess himself indebted to the learned and accomplished author* of the "Elements of Logic," not only for the advantage of his published writings, but for many acts of private courtesy.

* The present Archbishop of Dublin.

A GUIDE TO SYLLOGISM,

&c. &c.

OF REASONING AND SYLLOGISM.

1. An act of reasoning is performed by comparing two ideas together by means of a third, that must agree with *one* of them. If this third idea agrees with the other two, those two, of course, *agree* with one another; if it agrees with only one, they, of course, *disagree* with one another.*

2. A syllogism (from *συλλογίζομαι*, to reason) is an argument stated at full length, and in regular logical form.

3. By an argument's being stated at full length, is meant, that the application of the third idea to

---

* E. G. In reasoning on the character of Cæsar, if I wished to ascertain whether the idea of 'a good man' agreed with him, I might take, for a third idea, that of 'Tyrant.' On finding this *agree* with 'Cæsar,' and *disagree* with 'good man,' I should say that the ideas of 'Cæsar' and 'good man' *disagreed with one another*; or, in other words, that 'Cæsar was not a good man.' The third idea, thus employed to assist us in forming a judgment, is called *a middle term.*

the two others is expressed in terms, and that however obvious the application may be, in the case of one of them, it is never, on that account, taken for granted.

4. By an argument's being stated in regular logical form, is meant, its being so arranged, that the conclusiveness of it is manifest from the mere force of the expression, *i. e.* without considering the meaning of the terms. Thus,

Every Y is X,
Every Z is Y, therefore
Every Z is X.

If you grant the two former assertions, (or premises,) you cannot deny the conclusion.

5. Syllogisms are divided into Categorical,(from *κατηγορέω*, I affirm,) and Hypothetical, (from *ὑπόθεσις*, a supposition.) Categorical syllogisms are divided into Pure and Modal; hypothetical syllogisms into Conditional and Disjunctive. Syllogisms take their names from the different kinds of propositions employed in forming them.

OF PROPOSITIONS.

6. A proposition is a sentence that affirms or denies. It consists of three parts, viz. the *subject*,

or thing spoken of; the *predicate,* or that which is said of it; and the *copula,* which must be the substantive verb, with or without a negative particle, as the subject and predicate happen to agree or disagree.

7. The subject and predicate are called Terms or Extremes,* because, according to logical order, the subject is placed first, the predicate last, and the copula in the middle.

Ex.— | *Subj.* Vice | *Cop.* is | *Pred.* detestable. |

| *Subj.* Virtue | *Cop.* is not | *Pred.* unrewarded. |

8. The substantive verb alone is recognized by logic; all other verbs are resolvable into the substantive verb with a participle or adjective.

Ex.—The summer approaches.

| *Subj.* The summer | *Cop.* is | *Pred.* approaching. |

He does not know it.

| *Subj.* He | *Cop.* is not | *Pred.* aware of it. |

9. As the copula is used merely to express the agreement or disagreement of the terms, it is, or

* In speaking of a syllogism, the term "extremes" is often understood to imply the extremes of the *conclusion.*

may be, always put in the present tense. Should the tense of the substantive verb modify the sense of the proposition, this circumstance must be viewed as part of one of the terms.*

Ex.—Troy *is* existent.

Troy *was* existent, *i. e.*—

Subj.	*Cop.*	*Pred.*
Troy	is	a place that was formerly existent.

10. An adjective or participle, though it cannot be the subject, may yet be the predicate of a proposition; but even then a substantive appears to be understood; as, "Life is short," "Art is long." In these two propositions, the word "thing" may be supplied to each predicate.—*See* SYNCATEGOREMATIC WORD, *in the Index.*

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* The variety of expression allowable in language will often occasion a proposition to appear in a form very different from that recognized by logic. To that form, however, all propositions are reducible; and the pupil should be accustomed to bring into it with readiness, propositions of a dissimilar construction. E. G.

"Of his kingdom there shall be no end."

"An end of his kingdom is that which shall not be."

"In loftiness of thought Homer surpasses Virgil."

"Homer is a poet who surpasses Virgil in loftiness of thought."

"It is the duty of youth to reverence age."

"To reverence age is the duty of youth."

11. Propositions are either Categorical, (and subdivided into Pure* and Modal,) or Hypothetical (and subdivided into Conditional and Disjunctive.) This division is according to *substance*. They are either Affirmative or Negative. This division is according to *quality (i. e.* the quality of the *expression.)* They are Universal or Particular. This division is according to *quantity*.†

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* A pure proposition is sometimes called "propositio de inesse," because it simply states that the predicate is, or is not, (metaphysically,) in the subject.

† Another division of propositions is into Singular and Indefinite. A singular proposition is one of which the subject is an individual, (either a proper name, a singular pronoun, or a common noun with a singular sign.) E. G. "Cæsar overcame Pompey," "I am the person," "This fable is instructive." But as these propositions predicate of the *whole* of the subject, they fall under the rules that govern universals. It is to be observed, that if the subject of a proposition consist of a number of nouns *collectively* understood, so that they are viewed as *one single thing or body*, the proposition is *singular*. E. G. "All the books in Ptolemy's library amounted to 200,000 volumes," *i. e. all together*. "Two and two make four." "Cæsar, Pompey, and Crassus, constituted the first Triumvirate." When the word *together* can be added to the subject of the proposition, or when the word *each* cannot be introduced, that proposition is *singular*.

An indefinite proposition is one that has no sign of universality or particularity affixed to it, but leaves us to

12. A categorical proposition declares a thing [κατηγορεῖ] absolutely, as "I love," or "I am loving." "Man is not infallible." These are *pure* categoricals, asserting *simply* the agreement and disagreement of subject and predicate. "The wisest man may possibly be mistaken." "A prejudiced historian will probably misrepresent the truth." These are *modal* categoricals, asserting the *manner* of the agreement and disagreement between subject and predicate.*

13. A hypothetical proposition consists of two or more categoricals, united by a conjunction called the Copula. It asserts, not absolutely but, under an hypothesis or condition: such propositions are denoted by the conjunctions used in stating them. E. G. "If man is fallible, he is imperfect." This

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judge, from the nature of the connexion between the terms or Extremes, (No.7,) whether it should be reckoned as universal or particular. See No. 19.

* The modality of a proposition is usually considered to affect the copula. Logical writers have selected, as most worthy of remark, four modes of connexion between subject and predicate:—viz. necessary, possible, impossible, and contingent. E. G. "Man is necessarily an animal." "A globe may possibly consist of water." "It is impossible a man should be a stone." "John may, or may not, be learned."

is called a conditional proposition, denoted by the conjunction "if." "It is either day or night." This is a disjunctive hypothetical, and is denoted by the disjunctive conjunction "either."

14. An affirmative proposition is one of which the copula (No. 6.) is affirmative, A negative proposition is one of which the copula is negative. There is an example of each in No. 7.

15. A universal proposition is one of which the predicate is affirmed or denied of the *whole* of the subject. Its usual signs are "all," "every," "none," &c.;* or a universal proposition may have for its subject a proper name, or a common name with a singular sign.—See note to No. 11. E. G. "All tyrants are miserable," "No miser is rich," "England is an island."—A particular proposition is one of which the predicate is affirmed or denied of only *part* of the subject. Its usual signs are "some,"

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* To the signs of universality might be added "whoever," "each," "neither," "always," "every where," &c. To those of particularity, "a few," "not every," "sometimes," "somewhere," &c. There are some particular signs which make a near approach to a universal affirmative, as "many," "very many," "almost all," "by far the greater part," &c. Some, on the other hand, come very near to a universal negative, as "few," "very few," "scarcely any," &c.

"many," "few," "several," "most," and "all" or "every," if the copula be negative. E.G. "Some islands are fertile." "Many worthy men have to complain of ill fortune." "Most men are fond of novelty." "All tyrants (or some tyrants) are not assassinated." "None but" means "some, and those only," or "one person, thing, or object, and that only:" it is, therefore, the sign of a particular, or a singular, proposition.

DISTRIBUTION OF TERMS, SYMBOLS OF QUANTITY AND QUALITY, ETC.

16. In all universal propositions, the subject is *distributed;* an expression which signifies that a term is used in its fullest extent; that it stands for all its Significates, or the several things which it signifies: so that there is not an individual to which the common term is applicable, that it does not embrace. As, in the example, "All tyrants are miserable," the common term includes Dionysius, Phraates, Nero, and every individual who is a tyrant. In all particular propositions, the subject is undistributed; it stands for only part of its significates, and the common term then embraces only a part of the individuals to which it is applicable:—

as, in the example, "Some islands are fertile," the common term "island," though applicable to Iceland and all barren islands, does not embrace them.

17. There are four kinds of pure categorical propositions, distinguished by the symbols, A, E, I, O.

Universal affirmative, A.

Universal negative, E.

Particular affirmative, I.

Particular negative, O.

18. The connexion between the extremes of a proposition is Necessary, Impossible, or Contingent.

19. To determine whether an indefinite proposition should be viewed as particular or universal, we must look to the connexion between the extremes; *i. e.* we must consider of the subject and predicate, whether they *necessarily agree*, or *necessarily disagree*, or *may*, or *may not agree*. The nature of the connexion between the extremes is called the *matter* of the proposition. In necessary and in impossible matter, an indefinite is understood as a universal; as, "Birds have wings;" *i. e. all.* "Birds are not quadrupeds;" *i. e. none.* In contingent matter, *i. e.* where the terms sometimes agree and sometimes not, an indefinite is understood as a particular; as, "Food is necessary to

life;"* *i. e. some kind of food.* "Birds sing;" *i. e. some* birds sing. "Birds are not carnivorous;" *i. e. some* birds are not, or, all are not.

20. The rules for distribution are these:—

1st. All universal propositions, and no particular, distribute the *subject.*

2nd. All negative, and no affirmative, the predicate.†

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* The learner should observe that the term in question is "*a thing necessary to life,*" and not conclude, from the word "necessary," that the connexion between the terms "food" and "necessary to life" is a necessary connexion. It is *contingent;* because *it happens* that there are kinds of food which are *not* necessary to life; as *it happens* that there are birds which do *not* sing, and birds which *are* carnivorous. Whereas it *cannot happen* that *any* creature without wings, or that *any* quadruped, should be a bird. It is *necessary* that a creature should have wings to constitute it a bird, and *impossible* for a quadruped to be one.

† Thus the distribution or non-distribution of the *subject* of every proposition depends on its *quantity;* the distribution or non-distribution of the predicate, on its *quality:* and note further, that if, in an affirmative proposition, the whole of the predicate should agree with the subject, the circumstance is *accidental,* and not *implied* in the *form of expression.* In the propositions, "All men are rational animals," and "All men are animals," the form of expression is the same; but in the one instance, it so happens, that the whole of the predicate agrees with the subject, which is

21. Two propositions are said to be opposed, when, having the same subject and predicate, they yet differ in quantity, or quality, or both. (See Nos. 11, 14, 15.) The use of the rules of opposition is, that they immediately point out what we may infer with regard to the truth or falsity of any other proposition which has the same subject and predicate as the proposition before us, but differs from it either in quantity, or quality, or both.

22. There are four different kinds of opposition: —1st. between the two universals A and E, differing in quality only, and called *Contraries.* 2nd, between the two particulars I and O, differing also in quality only, and called *Subcontraries.* 3rd, between A and I, or E and O, differing respectively in quantity only, and called *Subalterns.* 4th, between A and O, or E and I, differing respectively both in quantity and quality, and called *Contradictories.**

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not the case in the other. "All rational animals are men," but "all animals are not men." In a just definition, the terms are always *exactly equivalent*, and therefore, *convertible.*

* Four things are requisite to form a just contradiction; —viz. that we speak of the same thing 1st in the same sense; 2nd, as to the same part; 3rd, compared with the

23. The signs "no" and "none" imply both universality and negation; they are contradictory, therefore, to the *particular* sign with an *affirmative* copula. We cannot contradict "some are," by "all are not." E. G. "*Some* monarchs *are* tyrants," "*All* monarchs *are not* tyrants,"—which are subcontrary propositions, perfectly compatible, and both particular.

24. Of subaltern propositions, the universal is called *subalternans*, the particular, *subalternate*.

25. *In necessary matter, all affirmatives are true,* (as, "All islands are surrounded by water," "Some islands are surrounded by water,") *and negatives false,* (as, "No islands are surrounded by water," "Some islands are not surrounded by water.") *In impossible matter, all negatives are true,* (as, "No triangles are squares,"

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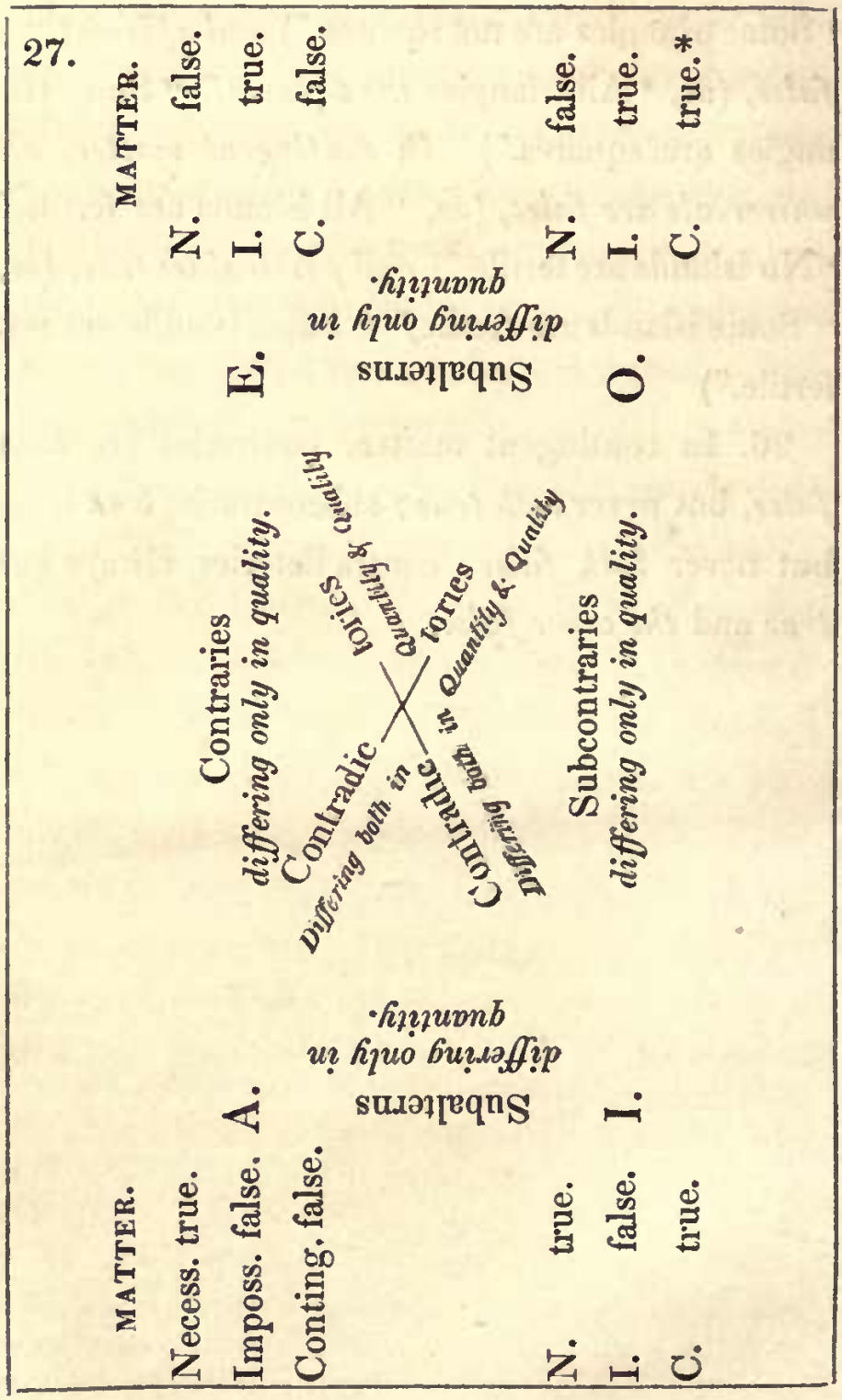
same thing; 4th, existing at the same time. By omitting one of these conditions, *is* and *is not* may be compatible. E. G. The carcass of a man *is* and *is not* a man; for *it is* a dead man, *it is not* a living one. 2nd. Zoilus *is* and *is not* black; for his face *is* black, and his hair *is not* black, but red. 3rd. Socrates *has* and *has not* a full head of hair; for he *has*, if compared with Scipio, he *has not*, if compared with Xenophon. 4th. Nestor *is* and *is not* old; for *he is*, if you speak of his third age, *he is not*, if you speak of his first.

"Some triangles are not squares,") *and affirmatives false,* (as, "All triangles are squares," "Some triangles are squares.") *In contingent matter, all universals are false,* (as, "All islands are fertile," "No islands are fertile,") *and particulars true,* (as, "Some islands are fertile," "Some islands are not fertile.")

26. In contingent matter, contraries are *both false,* but never *both true;* subcontraries *both true,* but never *both false;* contradictories, always *one true* and *the other false.*



* The truth or falsity of propositions is here seen to depend on the matter. See No. 19. Propositions may be

28. In subalterns, the truth of the particular, or *subalternate,* follows from the truth of the universal, or *subalternans;* and the falsity of the universal from the falsity of the particular.* The opposition between contradictories is so perfect, (since they differ both in quantity and quality, see No. 22.) that if any proposition is true, we may be sure its contradictory is false; if false, its contradictory true, &c.

CONVERSION OF PROPOSITIONS.

29. A proposition is said to be *converted,* when the subject and predicate are made to exchange places, as, "No triangles are squares," "No squares are triangles." The use of conversion is to give a ready insight into what may be inferred from another proposition, that differs from the one before us, by the terms being transposed. This change in the position of the terms may be combined with that of the quantity, or quality, or both, or neither,

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framed in A, E, I, O, on the following subjects, and adapted to the scheme by way of exemplification.

N. That islands should be surrounded by water.

I. That triangles should be squares.

C. That islands are fertile.

* If *all* islands are surrounded by water, it is plain that *some* must be so. If that *any one* triangle is a square be false, it must be false to say that *all* are so.

as the case may be. By conversion, a facility is likewise afforded in effecting the reduction of syllogisms, a process that will presently be explained.

30. The above is an instance of *simple conversion;* the subject and predicate being merely transposed; but as this can be done only when the terms of a proposition are of *exactly the same extent,* two other methods are in use, which enable us to convert, consistently with truth, every proposition whatever:—viz. 1st. the limitation of the predicate of the Exposita, (or proposition given,) from universal to particular, which is called conversion *per Accidens,* or by Limitation; and 2ndly, the adding *not* to the predicate of the exposita, and then denying its agreement with the subject, which is called conversion by Negation or Contra-position. But in the case of O, (the particular negative,) conversion by negation is effected by joining the negative particle of the copula to the predicate of the exposita, and then transposing the terms, as if the proposition had been I.

31. No conversion is employed for any logical purpose, unless it be *illative; i. e. when the truth of the converse is implied* by the truth of the exposita. (No. 30.)

32. Conversion is then only illative, when *no*

term is distributed in the converse, which was not distributed in the exposita; else, you would employ a term *universally* in the converse, which, in the exposita, was used only *partially*. (For "distributed" see No. 16.)

33. The following examples will shew how every proposition (A, E, I, O,) may be illatively converted, by some one of the three methods above mentioned:—viz. 1st, simply; 2nd, *per accidens*, or by limitation; 3rd, by negation or contraposition. E, I, simply; for E distributes both terms, (No. 16, 20.) and I, neither (No. 16, 20.); they are, therefore, of exactly the same extent (No. 30.), and simply convertible.

(E) No triangles are squares; therefore
No squares are triangles.

(I) Some islands are fertile places; therefore
Some fertile places are islands.

E, A, *per accidens*, or by limitation; E, because the predicate being distributed as well as the subject, and admitting, therefore, of the sign of universality, (as is shewn by simple conversion,) it must, as a universal, include the particular.

(E) No triangles are squares; therefore—
Some squares are not triangles.

(which follows from the truth of the simple converse.) A is converted *per accidens*, or by limitation; because, since it does not distribute the predicate (No. 20.), that predicate will not admit of a universal sign, and therefore requires a particular one.

(A) All birds are animals; therefore
Some animals are birds.

You could not say, "All animals are birds."

A, O, by negation; A, because the subject agrees universally with the predicate; so that what disagrees with the predicate cannot agree with the subject.*

(A) All birds are animals; therefore
What are not animals are not birds.

O, because, since you consider it as I, neither term is distributed, and the process is that of simple conversion.

(O) Some islands $\overset{Cop.}{\overline{\text{are not}}}$ fertile places; (first state this as I, by joining the negative to the pre-

* It is the same thing to *affirm* some attribute of the subject, and to *deny* the absence of it; thus (A) "All birds are animals," is equipollent to (E) "No birds are not-animals," which is of course simply convertible; "What are not animals, are not birds."

dicate, thus, "Some islands are | not-fertile-places," (*Pred.*) therefore—

Some places-not-fertile are islands.

You could not infer from the exposita, ("Some islands are not fertile places,") that "Some fertile places are not islands." Such a converse, indeed, would *accidentally* be true, but it would not follow from the form of expression. This will be seen by substituting other terms. E. G.

Some men | are not | poets; you cannot infer "Some poets are not men," but you *may* infer—

Some who are not poets are men.

34. To assist the memory in applying the two former methods of conversion, (viz. simple, and *per accidens,*) Aldrich, who does not notice conversion by negation, gives the following mnemonic line;

fEcI simpliciter, convertitur EvA per Acci.

For the last, we may say,

A sed, et O pariter, convertas usque Negando.

Or,

fAxO per Contra; sic fit conversio tota.

OF SYLLOGISMS.

35. The validity of a syllogism depends on this axiom of Aristotle, "Whatever is predicated of a

term distributed, (No. 16.) whether affirmatively or negatively, may be predicated in like manner of every thing contained under it." In the example at No. 4, X is predicated of Y distributed, and Z is contained under Y, *(i. e.* is its subject;) X is, therefore, truly predicated of Z.

36. There are two canons of pure categorical syllogisms; 1st, *Two terms that agree with one and the same third, agree with each other;* 2nd, *Two terms, of which one agrees and another disagrees with one and the same third, disagree with one another.* On the former of these canons rests the validity of *affirmative* conclusions; on the latter, of *negative.*

37. There are six rules for ascertaining whether the canons have been strictly observed or not.

Rule 1st. *Every syllogism has three, and only three, terms;* viz. the middle term, and the two terms of the conclusion, or question.* The *subject* of the conclusion is called the *minor term;*† its *predicate,* the *major term;* and the middle

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* These are commonly called *Extremes.*

† Because generally of less extent than the major and middle terms.

term is that with which each of them is separately compared, in order to judge of their agreement or disagreement with each other.*

Rule 2nd. *Every syllogism has three, and only three, propositions;* viz. the *major premiss,* in which the *major term* is compared with the *middle;* the *minor premiss,* in which the *minor term* is compared with the *middle;* and the conclusion, in which the *minor term* is compared with the *major.*

Rule 3rd. *The middle term must not be ambiguous;*† which is the case whenever it is *equivocal,* or *undistributed.* An equivocal term is used in different senses in the two premises; E.G.

"*Sage* is a plant;
A philosopher is *sage;* therefore
A philosopher is a plant."

If a term be undistributed, as it then stands for a *part* only of its significates, it may happen that one of the extremes may have been compared with one part of it, and the other with another part: E.G.

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* If there were two middle terms, the extremes not being both compared with the *same,* could not be conclusively compared with each other.

† If the middle term is ambiguous, there are, in reality, two middle terms in *sense,* though but one in sound.

"Apples are fruit;
Cherries are fruit; therefore
Cherries are apples."

The middle term, therefore, must be distributed once, at least, in the premises; *i. e.* by being the subject of a universal, or predicate of a negative.

Rule 4th. *No term must be distributed in the conclusion, which was not distributed in one of the premises;* because you would then employ the whole of a term in the conclusion, when you had employed only a part of it in the premiss; and thus, in reality, introduce a fourth term. The violation of this fourth rule is called an *illicit process* of the major or minor term; E. G.

*"All apples are fruit;
Cherries are not apples; therefore
They are not fruit." Illicit process of the major.

"All beasts of prey are carnivorous;
†All beasts of prey are animals; therefore
All animals are carnivorous." Illicit process of the minor.

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* This is A, and no affirmatives distribute the predicate. The conclusion is E, and all negatives *do* distribute the predicate. (No. 20.)

† This also is A, and does not distribute the predicate.

Rule 5th. *From negative premises you can infer nothing;* for in them the middle term is pronounced to *disagree with both extremes,* not to *agree with both,* or to agree with one and *disagree* with the other: therefore they cannot be compared together; E. G.

"A fish is not a quadruped;"

"A bird is not a quadruped,"* proves nothing.

Rule 6th. *If one premiss be negative, the conclusion must be negative;* for in that premiss the middle term is pronounced to disagree with one of the extremes, and in the other premiss, (which must be affirmative by the preceding rule,) to agree with the other extreme; therefore, the extremes disagreeing with each other, the conclusion is negative. To prove a negative conclusion, one of the premises must be negative.†

"animals." The conclusion again is A, and *does* distribute the *subject*, "animals."

* In order to shew the disagreement between the terms "fish" and "bird," you must choose a middle term that agrees with one of them. E. G. "A feathered creature is not a fish; a bird is a feathered creature; therefore," &c. Or, "No animal that inhabits the water is a bird; a fish is an animal that inhabits the water; therefore," &c.

† To prove that the sun is not a planet, you must not

38. From these rules it is evident, first, that* *nothing can be proved from two particular premises;* and secondly,† that *if one of the premises be particular, the conclusion must be particular.*‡

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take for a middle term "sphere," which agrees with both, but a middle term that disagrees either with "sun" or "planet." E. G. "Every planet describes an orbit; the sun does not describe an orbit; therefore it is not a planet." Or, "The sun is a fixed star; a planet is not a fixed star; therefore it is not the sun."

* You will then have either the middle term undistributed, or an illicit process. E. G. "Some animals are sagacious; some beasts are sagacious; therefore, some beasts are animals." Undistributed middle. This conclusion is true, but does not follow from the premises. The argument is of the same construction as the following absurdity: "Some animals are black; some hats are black; therefore, some hats are animals." Again, "Some animals are sagacious; some beasts are not sagacious; therefore, some beasts are not animals." Here is an illicit process of the major. "Some carnivorous creatures are tame; some beasts are not tame; therefore, no beasts are carnivorous creatures." This exhibits an illicit process of both the major and minor term.

† E. G. "All who fight bravely deserve reward; some soldiers fight bravely; therefore, some soldiers deserve reward." If you were to infer, "All soldiers deserve, &c." there would be an illicit process of the minor.

‡ The following mnemonic lines, from Aldrich, may assist the student in applying these rules and remarks;

39. From universal premises you cannot always infer a universal conclusion; E. G. "All gold is precious; all gold is a mineral; therefore some mineral is precious." But when you *can* infer a universal, you are always *at liberty* to infer a particular.

OF MOODS.

40. The mood of a syllogism is the designation of it according to the quantity (No. 11.) and quality (No. 11.) of each of its three propositions, which are denoted by the vowels A, E, I, O, (No. 17.). There are only eleven moods admissible, as conforming to the rules laid down at No. 37. *See No.* 44, *below.*

OF FIGURES.

41. The figure of a syllogism indicates the situ-

Distribuas medium (Rule 3.), nec quartus terminus adsit; (Rule 1 & 2.)

Utraque nec præmissa negans (Rule 5.), nec particularis; (No. 38.)

Sectetur partem Conclusio deteriorem; (Rule 6,& No. 38.)

Et non distribuat, nisi cum præmissa, negetve. (Rule 4 & 6.)

Logicians have attached to universal propositions an imaginary superiority over particulars, and to affirmatives a similar superiority over negatives. Hence the expression "pars deterior," meaning a particular or a negative proposition.

ation of the middle term with regard to the extremes of the conclusion, or *major and minor term.* (No. 37, Rule 1, and Note.) There are four figures.* In the first, the middle term is made *the subject of the major premiss, and the predicate of the minor:* in the second, the middle term is the *predicate of both premises:* in the third, *the subject* of both: in the fourth, it is *the predicate of the major premiss, and the subject of the minor.*

42. The major premiss of a syllogism is usually placed first, although, of course, the validity of the argument is not affected by the order of the two premises.

43. Each of the moods alluded to in No. 40, as admissible, will not be so in every figure; since, from the different position of the middle term, it may violate some of the foregoing rules in one figure, though not in another.†

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* The first figure is the most natural and clear, and is at once open to the application of Aristotle's dictum. (No. 35.) The last is, in all respects, the very reverse of the first.

† I, A, I, for instance, is allowable in the third figure; because, in that figure, the middle term is made the subject of both the major and minor premiss. (No. 41.) It is, therefore, regularly distributed in the minor proposition A, (No. 20,) and as *neither* term is distributed in the conclusion I,

44. Although but eleven moods were stated to be admissible at No. 40, yet, since some of them occur in more than one figure, (as E, I, O, which

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(No. 16, 20,) there can be no illicit process. (No. 37.) But I, A, I, is inadmissible in the first figure, because that figure demands that the middle term be made the subject of the major proposition I, and the predicate of the minor A. But I distributes neither term, and A, only the subject. (No. 20.) The middle term, therefore, being the subject of a particular, and the predicate of an affirmative, would be undistributed, contrary to rule, and no valid conclusion could follow. E. G.

I. Some arrogant men are learned;
A. All arrogant men are disagreeable; therefore
I. Some learned men are disagreeable.

The above is in the third figure, and valid. In the first figure, the same mood would be inadmissible, for the reasons above stated. E. G.

I. Some learned men are Englishmen;
A. The sages of Greece were learned men; therefore
I. Some of them were Englishmen.

So A, E, E, would, in the first figure, have an illicit process of the major; thus

A. Every fool is a sensualist;
E. No true philosopher is a fool; therefore
E. No true philosopher is a sensualist.

The major term, "sensualist," is not distributed in the major proposition, but is, in the conclusion. The same mood, in the second figure, is valid, because the major term "sensualist" is regularly distributed in the major proposition; E. G.

is found in all the four,*) each separate occurrence is reckoned as a new mood. From this recurrence of the same symbols in different figures, there are reckoned nineteen moods.

A. Every sensualist is a fool;
E. No true philosopher is a fool; therefore
E. No true philosopher is a sensualist.

Again, A, A, A, is allowable in the first figure;

A. All wicked men are miserable;
A. All tyrants are wicked men; therefore
A. All tyrants are miserable.

But, in the third figure, it would have an illicit process of the minor;

A. All wicked men are miserable;
A. All wicked men are tyrants; therefore
A. All tyrants are miserable.

The minor term, "tyrants," is not distributed in the minor premiss; but is, in the conclusion.

*A A A. Barbara.	A O O. Fakoro.
A A I. Darapti Bramantip.	E A E. Cesare, Celarent.
A E E. Camestres, Camenes.	E A O. Felapton, Fesapo.
A E O.	E I O. Ferio, Festino, Feriso
A I I. Darii, Datisi.	Fresison.
I A I. Disamis, Dimaris.	O A O. Dokamb.

A, E, O, is valid in the second figure, but useless, because it has a particular conclusion when you *might* draw a *universal* one in Camestres. E. G. (A.) Every X is Y. (E.) No Z is Y. (O.) Some Z is not X. You *might* say, *No* Z is X. (A.) "Every man is a sinner. (E.) No glorified spirit is a sinner. (O.) Some glorified spirit is not a man."

45. The vowels in the four following mnemonic lines are the symbols which denote the quantity and quality of the propositions. The consonants serve to keep in mind the figure of the syllogism.

Fig. 1. B*a*rb*a*r*a*, C*e*l*a*r*e*nt, D*a*r*ii*, F*e*r*io*que prioris;
Fig. 2. C*e*s*a*r*e*, C*a*mestr*e*s, F*e*st*i*no, F*a*k*o*r*o*, secundæ;
Fig. 3. Tertia, D*a*r*a*pt*i*, D*i*sam*i*s, D*a*t*i*s*i*, F*e*lapt*o*n, D*o*k*a*m*o*, F*e*r*i*s*o*, habet; quarta insuper addit
Fig. 4. Br*a*m*a*ntip, C*a*m*e*n*e*s, D*i*mar*i*s, F*e*s*a*p*o*, Fres*i*s*o*n.

46. It will assist the experiment of syllogisms in the different moods, if the letters X, Y, Z, are used as representatives of the different terms. Let X be the major, Y the middle, Z the minor.

SCHEME.

1st Fig.	*2nd Fig.*	*3rd Fig.*	*4th Fig.*
Y, X,	X, Y,	Y, X,	X, Y,
Z, Y,	Z, Y,	Y, Z,	Y, Z,
Z, X,	Z, X,	Z, X,	Z, X.

You *might* say, "No glorified spirit," &c. The same may be remarked of A, A, I, and E, A, O, in the first figure, and of E, A, O, in the second, as well as of A, E, O, in the fourth. See No. 39. These five moods, being useless, are without names.

By applying the moods *Barbara, Celarent, &c.* to the terms thus designated by the letters X, Y, Z, you may construct a short syllogism in every figure, and perceive how its validity is derived from an accordance with the six rules laid down above. No. 37.*

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* Thus B*arba*ra, in which all the propositions are universal and affirmative, as the three A's denote.

B*ar*- "Every Y is X;
-b*a*- Every Z is Y;
-r*a*. Every Z is X."

C*elar*ent, in which the major is universal and negative, the minor universal and affirmative, and the conclusion universal and negative.

C*e*- "No Y is X;
-l*a*- Every Z is Y;
-r*e*nt. No Z is X."

D*arii*, in which the major is universal and affirmative, the minor particular and affirmative, and the conclusion the same.

D*a*- "Every Y is X;
-r*i*- Some Z is Y;
-*i*. Some Z is X."

F*erio*, in which the major is universal and negative, the minor particular and affirmative, and the conclusion particular and negative.

F*e*- "No Y is X;
-r*i*- Some Z is Y;
-*o*. Some Z is not X.

Apply the other moods C*esare* C*amestres*, &c. in the same way to the second figure; D*arapti*, &c. to the third; Bra

47.* Every proposition may be proved in the first figure, and all the moods in the three other figures reduced to it. See No. 53 *et seq.* below.

48. Four syllogisms, exemplifying one mood in each figure, are subjoined.

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mantip, &c. to the fourth; carefully remembering the force of the symbols A, E, I, O, (No. 17.) The position of the Letters X, Y, Z, in the scheme, secures the learner against any mistake in placing the terms of each figure.

* It will be seen that A, or the universal affirmative, can be proved only in the first figure; as the second proves only negatives, (E, E, O, O,) the third only particulars, (I, I, I, O, O, O,) and the fourth only particulars or negatives. (I, E, I, O, O.) The first figure requires the major premiss to be universal, and the minor affirmative; the former, in order to distribute the middle term, and the latter, to avoid the fault of negative premises, (No. 37. Rule 5.) or to produce an affirmative conclusion. (No. 37. Rule 6.) The second figure proves only negatives, because the middle term, being the predicate in both premises, would not be distributed, unless one premiss were negative, (No. 20. Rule 2.) and therefore the conclusion must be negative. (No. 37. Rule 6.) The third proves only particulars, because the middle term being always the subject in the minor proposition, and that minor proposition being always affirmative, the minor term, as the predicate of an affirmative, cannot be distributed in its premiss, and therefore cannot be distributed in the conclusion.

Barbara. *Fig.* 1.

TERMS.

Major (X) One who deserves punishment.

Minor (Z) Every blasphemous writer.

Middle (Y) Every one who injures the public morals.

Bar- Every Y is X; All who injure the public morals deserve punishment;

-ba- Every Z is Y; All blasphemous writers injure the public morals; therefore

-ra. Every Z is X; All blasphemous writers deserve punishment.*

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* The regular expression of the copula, *is* and *is not*, may always be preserved, if we disregard the clumsiness of the language; thus, the syllogism above may be stated as follows:

Bar- All who injure the public morals *are* persons deserving of punishment;

-ba- All blasphemous writers *are* persons who injure the public morals; therefore

-ra. All blasphemous writers *are* persons deserving of punishment.

Pupils should be able to state a proposition readily in this strict form.

49. *Cam*estres. *Fig.* 2.

TERMS.

Major (X) What is truly satisfactory.
Minor (Z) Guilty pleasures.
Middle (Y) What is unattended with remorse.

Cam- Every X is Y; Whatever is truly satisfactory is unattended with remorse;
-es- No Z is Y; No guilty pleasures are unattended with remorse; therefore
-tres. No Z is X. No guilty pleasures are truly satisfactory.

50. *Dar*apti. *Fig.* 3.

TERMS.

Major (X) What is entitled to respect.
Minor (Z) What is often ridiculed.
Middle (Y) True piety.

Da- Every Y is X; True piety is entitled to respect;
-rap- Every Y is Z; True piety is often ridiculed; therefore
-ti. Some Z is X. Something often ridiculed is entitled to respect.

51. *Camenes.* *Fig.* 4.

TERMS.

Major (X) A useful study.

Minor (Z) What is injurious to the morals.

Middle (Y) What is worthy of encouragement.

Cam- Every X is Y; All useful studies are worthy of encouragement;

-en- No Y is Z; Nothing worthy of encouragement is injurious to the morals; therefore

-es. No Z is X. What is injurious to the morals is not a useful study.*

52. The four moods of the first figure are called *fect;* all the rest, *imperfect.* When a syllogism in one of the imperfect moods is re-stated, and brought into the first figure, it is said to be *reduced.*

OSTENSIVE REDUCTION.

53. In reducing a syllogism, it is allowable to convert the premises illatively, (No. 31,) or to transpose them. This liberty renders it always possible to deduce, in the first figure, either the very same conclusion as the original one, or another, from which the original one is deducible by illative conversion.

* The method of statement in this figure is so clumsy and inverted, that it is seldom or never used. The propo-

54. The initial letters of the imperfect moods correspond with those of the four perfect ones, B, C, D, F, and indicate into which of them the imperfect mood is capable of being reduced. Thus *Bramantip* is to be reduced into *Barbara*, *Cesare* and *Camestres* into *Celarent*, *Festino* into *Ferio*, *&c.*

55. The letter *m*, occurring in the name of an imperfect mood, indicates that, in reducing it, the premises are to be transposed; *s*, that the proposition denoted by the vowel immediately preceding, is to be *converted simply* (No. 33.); *p*, that it is to be *converted per accidens* or limitation (No. 30.); (except in the case of *Bramantip*, where *p* denotes that the conversion of A *per accidens* has *already* taken place;*) *k*, that it is to be *converted* by *negation.* (No. 30.)†

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sitions are easily reduced into the more natural arrangement of the first figure. See No. 54.

* E. G. Bram- All blasphemous writers injure the public morals;
-an- All who injure the public morals deserve punishment; therefore
-tip. Some who deserve punishment are blasphemous writers.

The conclusion is the converse *per accidens* of the conclusion of the Syllogism in Barbara, No. 48.

† The *Reductio ad impossibile* I have not thought it ne-

56. A few examples of reduction may suffice: *Camestres* is reduced to *Celarent,* as the initial letter directs, by simply converting the minor, (as is denoted by the *s* in *es,*) and then transposing the premises, (as is indicated by the *m* in *Cam.)* The conclusion of the reduced syllogism is the simple converse of the conclusion of the original one.

CAMESTRES. *See No.* 49.

Reduced to CELARENT.

Ce- What is unattended with remorse is not a guilty pleasure;

-la- Whatever is truly satisfactory is unattended with remorse; therefore

-rent. Whatever is truly satisfactory is not a guilty pleasure.

57. *Fakoro* is reduced to *Ferio* by converting the major by negation, (No. 30.) and considering

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cessary to explain. Its object is, to show that an absurdity would follow from supposing the original conclusion to be false. When this mode of reduction is adopted, *Fakoro* and *Dokamo* are called *Baroko* and *Bokardo,* K being then the sign of the *Reductio ad impossibile.* But conversion by negation is by far the easier and more expeditious process.

the minor premiss affirmative; *i. e.* attaching the negative to the predicate instead of the copula. (No. 30.)

FAKORO.

Reduced to FERIO.

Fak- Every sincere Christian is charitable;

-o- Some professors of religion are not charitable; therefore

-ro. Some professors of religion are not sincere Christians.

Fe- He who is not-charitable is not a sincere Christian.

-ri- Some professors of religion are | not-charitable; | therefore (*Predicate.*)

-o. Some professors of religion are not sincere Christians.*

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* *Fakoro* may be considered as *Festino*, and stated accordingly, by placing an equipollent negative Proposition for the major, (No. 33, Note,) and viewing the minor as an affirmative.

Fes- | No sincere Christian | (*Subject.*) is | not-charitable; | (*Predicate.*)

-ti- Some professors of religion are | not-charitable; | (*Predicate*) therefore

-no. Some professors of religion are not sincere Christians.

The minor premiss is here considered affirmative, because you take "not-charitable" as the middle term, and cannot separate the negative from it, without introducing a fourth term, contrary to No. 37, Rule 1.

58. *Darapti* is reduced to *Darii* by converting *per accidens* (No. 30.) the minor premiss. This is denoted by the *p* in *rap*. (No. 55.)

Festino is reduced to *Ferio* by simply converting the major; "He who is not charitable is not a sincere Christian," &c.

So *Dokamo* may be considered as *Disamis*, and stated accordingly, by joining the negative to the predicate instead of the copula, in the major and conclusion; *i. e.* viewing O as I;

Predicate.

Dis- Some desires are | not-blameable; |

-am- All desires are liable to excess; therefore

Predicate.

-is. Some things liable to excess are | not-blameable. |

Disamis is reduced to *Darii* by simply converting the major, and then transposing the premises.

Da- All desires are liable, &c.

-ri- Some things not blameable, &c.; therefore

-i. Some things not blameable, &c. as at No. 59.

DARAPTI. *See No.* 50.

Reduced to DARII.

Da- True piety is entitled to respect;
-ri- Something often ridiculed is true piety; therefore
-i. Something often ridiculed is entitled to respect.

59. *Dokamo* is reduced to *Darii* by converting the major by negation, and then transposing the premises.

DOKAMO.

Reduced to DARII.

Dok- Some desires are not blameable;
-am- All desires are liable to excess; therefore
-o. Some things liable to excess are not blameable.
Da- All desires are liable to excess;
-ri- Some things not blameable are desires; therefore
-i. Some things not blameable are liable to excess.

This conclusion is the converse by negation of the original one, (*i. e.* O converted into I,) and therefore, simply convertible into it. (No. 33.)

60. Those syllogisms are called Modal, that consist of modal propositions. (No. 12.) Modal propositions may be considered as pure categoricals, and stated accordingly. For this purpose, you should attach the mode to one of the terms; as, "The wisest man may possibly be mistaken."

Subj.	*Cop.*	*Pred.*
"The wisest man	is	one who may possibly be mistaken."

"It is probable that Livy was prejudiced; *i. e.*

Subj.	*Cop.*	*Pred.*
"Livy	was	probably prejudiced."

61. When the mode expresses only the necessary, impossible, or contingent connexion of the terms, you may attach it to the *subject*, as "Man is *necessarily* mortal;" *i. e.* "*All* men are mortal." "It is *impossible* for a bad man to be happy;" *i.e.* "*No* bad man can be happy."

62. It is often, however, most convenient to affirm simply the agreement or disagreement of the mode with the dictum, or assertion itself; as "I am possibly mistaken,"

Subj.	*Cop.*	*Pred.*
"That I am mistaken	is	possible."

In these cases, the subject implies that an entire act of judgment has previously taken place.

OF HYPOTHETICAL SYLLOGISMS.

63. A syllogism is called Hypothetical, when it contains one, two, or three hypothetical propositions; E. G. "If he is wise, he is happy; he is wise; therefore he is happy." Or, "He who is wise, is happy; if he is a philosopher, he is wise; therefore, if he is a philosopher, he is happy." Or, "If he is wise, he is happy; if he is a philosopher, he is wise; therefore, if he is a philosopher, he is happy." See No. 13. The hypothetical syllogisms most in use are divided into Conditional and Disjunctive. E. G.

CONDITIONAL.

If man is fallible, he is imperfect;
But he is fallible; therefore
He is imperfect.

DISJUNCTIVE.

It is either day or night;
But it is day; therefore
It is not night.

64. In a hypothetical syllogism, the reasoning

turns on the hypothesis, and the conclusion is always categorical.*

The hypothetical premiss is called the major, and the categorical one, the minor.

OF CONDITIONAL SYLLOGISMS.

65. It is to be observed of a conditional proposition, that it contains two, and only two, categorical propositions, whereof one results from the other; that from which the other results is called the Antecedent;* that which results from it, the Consequent *(Consequens.)* The connexion between the two (expressed by "if") is called the Consequence (*consequentia.*)

Consequentia. *Antecedent.* *Consequent.*

"If man is fallible, he is imperfect."

66. The truth or falsity of a conditional proposition depends entirely on the *consequence*, or *con-*

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* When a hypothetical conclusion is drawn from a hypothetical premiss, the reasoning is, in effect, categorical. E.G.

Predicate.

Every conqueror is either a hero or a villain;
Cæsar was a conqueror; therefore

Predicate.

He was either a hero or a villain.

* The antecedent is sometimes placed *after* the consequent. We might say, "Man is imperfect, if he is fallible."

nexion between antecedent and consequent. Both antecedent and consequent may be false, yet if there be such a connexion between them, that the falsity* of the antecedent *depends* on the falsity of the consequent, the whole proposition is valid. E. G.

Antecedent.

If | logic is useless, |

Consequent.

| it deserves to be neglected. |

On the other hand, both antecedent and consequent may be *true;* yet if there be no connexion between them, so that the latter does not depend for its truth on the former, the whole proposition is *false; i. e.* the consequent does *not follow* from the antecedent.

Antecedent.

If | Virgil was a poet, |

Consequent.

| he wrote the Æneid. |

It is true both that Virgil was a poet, and that he

* If you deny the consequent, "Logic deserves to be neglected," the falsity of the antecedent, "Logic is useless," must follow. This will appear from a categorical statement of the proposition. (A) "Whatever is useless is deserving of neglect." Convert this by negation. (E) "Whatever is not deserving of neglect is not useless. (No. 30.) Logic is not deserving of neglect; therefore it is not useless."

wrote the Æneid, but it does not follow that *because* he was a poet, he *therefore* wrote the Æneid.

67. There are two rules for drawing a conclusion from a conditional proposition. Rule 1. *The antecedent being granted, the consequent may be inferred*; E. G.

"If A is B, C is D; Major. "If rain has fallen, the ground is wet;

But A is B; Minor. But rain has fallen;

therefore therefore

C is D." Conclusion. The ground is wet."

These syllogisms, in which the antecedent is granted, are called *Constructive.*

Rule 2. *The consequent being denied, the antecedent may be denied.*

"If A is B, C is D; "If rain has fallen, the ground is wet;

But C is not D; therefore But the ground is not wet; therefore

A is not B." Rain has not fallen."

These syllogisms, in which the consequent is denied, are called *Destructive.*

68. By *denying* the *antecedent,* or *affirming* the *consequent,* nothing can be inferred, because the same consequent may follow from *other* antece-

dents. *Rain may not have fallen, and yet the ground may be wet; or †the ground may be wet, and yet no rain have fallen; because dew or an inundation would produce the same effect.‡

OF DISJUNCTIVE SYLLOGISMS.

69. To what has been said of a disjunctive pro-

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* Here the antecedent is denied.

† Here the consequent is affirmed.

‡ Conversion by negation (No. 30) is applicable to conditional propositions; *i. e.* the contradictory of the consequent may be taken for the antecedent, and the contradictory of the antecedent for the consequent.

"If rain has fallen, the ground is wet;
But rain has fallen; therefore
The ground is wet." } Constructive.

"If the ground is not wet, rain has not fallen;
But rain has fallen; therefore
The ground is wet." } Destructive.

By this conversion of the major premiss of a constructive syllogism, (the minor, of course, remaining unchanged,) you will reduce a constructive syllogism into a destructive, because you deny the consequent. You will reduce a destructive syllogism into a constructive, because you affirm the antecedent. E. G.

"If rain has fallen, the gound is wet;
But the ground is not wet; therefore
Rain has not fallen." } Destructive.

"If the ground is not wet, rain has not fallen;
But the ground is not wet; therefore
Rain has not fallen." } Constructive

sition (No. 13) must be added, that it consists of two or more categoricals so stated, as to imply that *some one* of them, at least, is true, and generally that *but one* can be true; as, "It is either day or night."

70. By denying one of the categoricals of a disjunctive proposition, if there be but two, you may infer the truth of the remaining one; as, "It is either day or night: but it is not day; therefore it is night." By denying one of them, if there be several, you may infer the truth of *some one* of the remaining ones; as, "It is either Spring, Summer, Autumn, or Winter; but it is not Spring; therefore it is either Summer, Autumn, or Winter.' By denying all but one, you will infer the truth of that one; as, "It is neither Spring, Summer, nor Autumn; therefore it is winter."

71. When it is implied that only one of the categoricals can be true, by *affirming* one, you, of course, deny the rest. As, "It is either Spring, Summer, &c.; but it is Spring; therefore it is neither Summer, Autumn, nor Winter."*

* If *both* categoricals should be true, it is plain that the affirmation of one cannot imply the denial of the other; as, "Amphibious creatures live either on land or in the water."

72. The dilemma* is a redundant conditional syllogism, with two or more antecedents in the major premiss, and a disjunctive minor.

73. Dilemmas are either Constructive or Destructive. Of the constructive dilemma there are two sorts, *Simple* and *Complex*. There is but one sort of the true destructive dilemma.

74. The simple constructive dilemma has but *one consequent* to each antecedent. The antecedents being disjunctively granted, in the minor, the common consequent is inferred. See No. 67. Rule

	Major.	
1.	"If A is B, C is D; and if E is F, C is D.	
	Minor.	*Conclusion.*
	But either A is B, or E is F;	therefore C is D."

"If a Christian be living, he is the Lord's servant; and if he be dead, he is the Lord's servant; but he

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*As, in this kind of argument, there are generally, in the major premiss, two antecedents, which, in the minor, become two assumptions, it is termed a *dilemma*, from δὶς *twice, two*, and λῆμμα, *an assumption*. It is called by the lexicographers, "Syllogismus ab utrâque parte feriens adversarium," and "Argumentum cornutum," because most horned animals have *two horns*, and there are, in a dilemma, *two instruments of attack*, furnished in the two assumptions. So Cowley, "Both the horns of fate's dilemma wound."

must be always either living or dead; therefore he is always the Lord's servant." (See *Romans*, xiv. 8.)*

75. The complex constructive dilemma has a different consequent to each antecedent. The antecedents are disjunctively granted, in the minor, and the different consequents disjunctively inferred.

E.G. | "If A is B, C is D, and if E is F, G is H; | *Major.* | but either A is B, or E is F; | *Minor.* | therefore either C is D, or G is H." | *Conclusion.* "If the Evangelists speak truth, Christianity is of God, and if they do not speak truth, the existence of Christianity is perfectly unaccountable; but the Evangelists either do or do not speak truth; therefore Christianity is either of God, or its existence is perfectly unaccountable."

76† The true destructive dilemma has, like the

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* The conditionals of the major premiss may be united by the adverb "whether," so as to form one proposition; E. G. "Whether a Christian lives or dies, he is the Lord's servant."

† There is a form of argument incorrectly styled a destructive dilemma, in which the consequents are *wholly*

complex constructive, a different consequent to each antecedent, in the major. The consequents are disjunctively denied, in the minor, and the antecedents disjunctively denied, in the conclusion. E.G. "If A is B, C is D, and if E is F, G is H; but either C is not D, or G is not H; therefore either A is not B, or E is not F."—"If a witness be an honest one, he will not bear false testimony

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instead of *disjunctively*, denied in the minor. This is, however, a mere combination of *simple* conditional syllogisms, two or more being expressed together. It may consist either—1st, of one antecedent with several consequents; or, 2ndly, of several antecedents with one consequent; or, 3rdly, of several antecedents with several consequents. 1st, If A is B, C is D; if A is B, E is F; if A is B, G is H; but C is not D, E is not F, G is not H; therefore A is not B. 2ndly, If A is B, C is D; if E is F, C is D; if G is H, C is D; but C is not D; therefore A is not B, E is not F, G is not H. 3rdly, If A is B, C is D; if E is F, G is H; if I is K, L is M; but C is not D, G is not H, L is not M; therefore A is not B, E is not F, I is not K. Should you, in the first case, deny the consequents *disjunctively* instead of *categorically*, you will not thereby make the argument a dilemma; for if *all* the consequents be not true, the *one antecedent* must fall to the ground. E. G. "If A is B, C is D; if A is B, E is F; if A is B, G is H; but either C is not D, E is not F, or G is not H; therefore A is not B. But in the correct destructive dilemma there is always a *disjunctive conclusion*.

designedly; and if he be a competent one, he will not do so undesignedly: but a witness who speaks false, does so either designedly or undesignedly; therefore he is either not honest or not competent."

77. The dilemma may always be reduced into simple conditional syllogisms, by adding a categorical minor to each antecedent and consequent of the major premiss of the dilemma. On such a statement, it will be seen that an opponent could not deny *both* the minors, and that he must, therefore, admit *one* of the conclusions.

78. In a constructive dilemma, some one of the antecedents is assumed to be true; and, in a destructive, some one of the consequents assumed to be false; but *which*, is left undetermined.

REDUCTION OF HYPOTHETICAL SYLLOGISMS.

79. To reduce a hypothetical syllogism into a categorical form, you must view every conditional proposition as a universal affirmative, taking the antecedent for the subject, and the consequent for the predicate.

Anteced.	*Conseq.*		*Subject.*		*Predicate.*
If A is B,	C is D;	Bar-	The case of A being B	is	the case of C being D;
But A is B;	therefore	-ha-	The present case is that of A being B;		therefore
C is D.		-ra.	The present case is that of C being D.		
Anteced.	*Conseq.*		*Subject.*		*Predicate.*
If A is B,	C is not D;	Cam-	The case of A being B,	is	the case of C not being D;
But C is D;	therefore	-es-	The present case is not the case of C not being D;		
A is not B.			therefore		
		-tres.	The present case is not the case of A being B.		

Camestres may, of course, be reduced to *Celarent*. But even destructive conditionals may be stated in *Barbara*, if you view them as constructive; which is done by converting by negation the major premiss. (See No. 68, *Note.*) This process of reduction, however, is explained merely to show the applicability of Aristotle's dictum to every form of argument; since the rules for hypothetical syllogisms are a sufficient test of their validity.

ENTHYMEMES.

80. The Enthymeme is a syllogism, with one of the premises omitted. This premiss is easily supplied by comparing the middle term with that term of the conclusion which is expressed *only once*. E. G.

"Isaiah was a prophet; therefore
He was inspired."

The middle term, of course, is that which does not enter into the conclusion, viz. "Prophet." —"Isaiah," or the minor term, is expressed *twice*. "Inspired," the major term, *only once*. Compare, therefore, the middle term with the major, thus supplying the major premiss; E. G.

"Every prophet is inspired;
Isaiah was a prophet; therefore
He was inspired."

If the minor premiss had been suppressed, the minor term "Isaiah" could have occurred *only once*. E. G.

"Every prophet is inspired; therefore
Isaiah was inspired."

You must, in that case, have taken the minor term "Isaiah" for comparison with the middle, thus supplying the minor premiss.*

81. By taking the two propositions of an enthymeme for an antecedent and consequent, you may form it into a conditional syllogism; E. G. "If Isaiah was a prophet, he was inspired."

OF THE SORITES.

82. A Sorites* is a brief form of connecting several syllogisms in the first figure. In a sorites, the predicate of the first proposition is made the

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* This is the ordinary way of speaking and writing, and in this concise form we continually reason in our minds, ἐν θυμῷ. Hence the term Enthymeme.

† From σωρὸς, a pile; because the propositions are *piled*, as it were, one on another.

subject of the next, and so on, to any length, till finally the predicate of the last of the premises is predicated, in the conclusion, of the subject of the first.

A is B;	Religion improves the morals;
B is C;	What improves the morals is beneficial to the community;
C is D; therefore	What is beneficial to the community deserves encouragement; therefore
A is D;	Religion deserves encouragement.

83. In a sorites, there are as many middle terms as there are intermediate propositions between the first and last; the subject of each intermediate proposition being a middle term. A sorites may, therefore, be drawn out into as many separate syllogisms as there are intermediate propositions.

84. In drawing out a sorites into distinct* syllogisms, you must take for your major premiss the *first intermediate* proposition of the sorites, and

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* By *distinct* and *separate* syllogisms, I mean those *in form*, with major, minor, and conclusion, into which the sorites may be expanded.

for your minor premiss, the *first* proposition of it; then draw your conclusion. The major proposition of your next syllogism must be the *second intermediate proposition* of the sorites, and your minor proposition must be the conclusion of your preceding syllogism; thence draw your second conclusion. Proceed thus till you have formed as many distinct syllogisms as the sorites contains intermediate propositions, and have arrived at the same conclusion. The sorites gives you only the *first* minor premiss, viz. in its first proposition. All the other *minor* premises consist of the conclusions of your separate syllogisms. All your *major* premises consist of the intermediate propositions of the sorites. E. G.

Intermediate Propositions.

"A is B, | B is C, C is D, D is E, | therefore A is E." Here is a sorites with three intermediate propositions, to be drawn out into three distinct syllogisms.

Syll. 1.	*Syll.* 2.	*Syll.* 3.
B is C;	C is D;	D is E;
A is B; therefore	A is C; therefore	A is D; therefore
A is C.	A is D.	A is E.

85. In a sorites, the *first* proposition alone (except, of course, the conclusion) may be *particular;* because the first proposition is made the minor of the distinct syllogism (No. 84) and may be particular, according to rule, (either Dar*i*i, or Fer*i*o.) The intermediate propositions being all majors of the distinct syllogisms, must be universals. (B*a*rbara, C*e*larent, D*a*rii, F*e*rio.)

86. The last premiss of the sorites (viz. the last intermediate proposition) is the only one that can be negative;"* because the last premiss alone never gives occasion to employ the conclusion of the distinct syllogism as the minor of a subsequent one. Should any other premiss of the sorites but the last be negative, it would lead to a negative conclusion, (No. 37, Rule 6,) and that conclusion, being made the minor of the following syllogism, would violate the first figure, which does not admit of a negative minor premiss. (Barb*a*ra, Cel*a*rent, Dar*i*i, Fer*i*o.)

87. A hypothetical sorites consists of a series of hypothetical syllogisms. In the constructive hy-

* Should a sorites *appear* to have a negative premiss before the last, the succeeding premiss will shew that the negative is, in reality, a part of one of the terms.

pothetical sorites, you proceed from the establishment of the first antecedent to the establishment of the last consequent. E. G.

If A is B, C is D; If it is the duty of a parent to take care of his children, he should keep them, as much as possible, from vice;

If C is D, E is F; If he should keep them from vice, he ought to teach them what is virtuous;

If E is F, G. is H; If he ought to teach them what is virtuous, he is bound to instruct them in religious knowledge;

But A is B; therefore G is H. But it is the duty of a parent to take care of his children; therefore He is bound to instruct them in religious knowledge.

In a destructive sorites, you go back from the denial of the last consequent, to the denial of the first antecedent; "G is not H; therefore A is not B."

"If Romish councils speak the truth, popery should be credited;

If popery should be credited, protestantism is fallacious;

If protestantism is fallacious, the Scriptures are not the rule of faith;

But the Scriptures are the rule of faith; therefore

Romish councils do not speak the truth."

OF INDUCTION.

88. Induction* is a kind of argument, which infers, respecting a whole class, what has been ascertained respecting one or more subdivisions of that class; or the drawing a general conclusion from as many particular instances as can be *brought in* to bear on the point in question; as if, on perceiving that the ox, sheep, deer, goat, and antelope, all ruminate, you should infer that *all horned animals* ruminate. Inductive arguments, which are usually stated as enthymemes,† (No. 80.) are, of course, easily filled up, so as to become regular syllogisms.

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* The term "Induction" is sometimes employed to designate the process of investigating and collecting facts; which is not a process of argument, but a *preparation for it.*

† The example given by Dr. Aldrich is inconveniently stated for reduction into a syllogistic form, a circumstance

EPICHIREMA.

89. One of the premises of a syllogism is occasionally confirmed by an incidental proposition, called a Prosyllogism. This proposition, with the premiss it is attached to, form an enthymeme. (No. 80.) The *incidental* proposition is the *expressed premiss* of the enthymeme, and the premiss it is attached to is the *conclusion*. E. G.

"All sin is dangerous;
Covetousness is sin; (for it is a transgression of the Law;) therefore
It is dangerous."

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which, perhaps, occasioned his error, (pointed out by Dr. Whately,) in directing the student to supply the minor, instead of the major, premiss of the enthymeme; "Hic et ille et iste magnes trahit ferrum; ergo omnis." The real subject here is, "ferrum trahere," the real predicate, "proprium hujus et illius et istius magnetis." The term expressed *but once* will be the major, "proprium omnis," which must therefore be compared with the middle, (No. 80.) viz. "proprium hujus, et illius, et istius magnetis."

Middle Term.
"What belongs to this, that, and the other magnet, is
Major Term.
what belongs to all;
Minor Term. *Middle*
The power of attracting iron is what belongs to
Term.
this, that, and the other magnet; therefore
Minor Term. *Major Term.*
The power of attracting iron is what belongs to all."

The minor premiss is an enthymeme; "Covetousness is a transgression of the law; therefore it is sin." A syllogism with such a premiss is called an Epichirema. (ἐπιχειρέω, I undertake to prove.)

EQUIVALENTS.

90. Equivalent terms are allowable for brevity's sake, as the pronoun for the noun; equivalent propositions are also allowable, as the illative converse for the exposita; (No. 30 *et seq.*) and such equivalents as may be supplied by ranking species under genus, &c.

IRREGULAR SYLLOGISMS.

91. The premises of a valid syllogism may appear negative, contrary to Rule 5, No. 37. One of the premises should then be stated as an affirmative. (See *Note* to No. 33, "It is the same," &c.)

"No one is wise who is not virtuous;
No gamester is virtuous; therefore
No gamester is wise."

The real middle term in this syllogism is, "not-virtuous," and it is in *Celarent*.

"He who is not-virtuous is not wise;
A gamester is not-virtuous; therefore
He is not wise."

92. From the variety of expression admissible in language, the logical order of subject and predicate is often inverted; and this will occasion the appearance of too many terms in the syllogism. All that is requisite, in such cases, is to restore the subject and predicate to their proper order. E.G.

"No irrational agent could produce a work which manifests design;
The universe is a work which manifests design; therefore
No irrational agent could have produced the universe."

Strictly considered, this syllogism has five terms, viz. 1. An irrational agent. 2. A being, able to produce a work which manifests design. 3. The universe. 4. A work which manifests design. 5. A being, able to produce the universe.

Middle Term. *Copula*
"| A work which manifests design | | could not
and Major Term.
be produced by an irrational agent; |
Minor Term. *Middle*
| The universe | is | a work which manifests
Term.
design; | therefore
Minor T. *Copula and Major Term.*
| It | | could not be produced by an irrational agent." |

93. The above irregularity is sometimes accompanied with a transposition of the premises, as in the following syllogism, which appears to be in the second figure, and faulty, from an affirmative conclusion. (*Note* to No. 47.)

"Every true patriot is disinterested;
Few men are disinterested; therefore
Few men are true patriots."

It is, in reality, *Barbara,* with a transposition of the premises, and of the terms of the major proposition; for you do not predicate of "few men," that they are "disinterested," but of "disinterested men," that they are "few."

"Disinterested men are few;
True patriots are disinterested men; therefore
True patriots are few."

94. By the use of conversion and equipollent propositions, such irregularities as the following are easily reduced to form.

"None but candid men are good reasoners;
Few infidels are candid; therefore
Few infidels are good reasoners."

The major premiss here is equipollent to "They who are not candid men are not good reasoners," which is the converse by negation of "All good reasoners are candid men." (No. 30.) State your

major proposition in A accordingly. The minor premiss and the conclusion are equipollent to "Most infidels are not candid;" therefore "Most infidels are not good reasoners." This will be a regular syllogism in *Camestres* or *Fakoro;** or it may be stated at once in *Celarent,* or *Ferio.*

"They who are not candid (or uncandid)
Copula
| are not | good reasoners;
Most infidels *Copula* | are | not candid; (or uncandid;)
therefore
Most infidels *Copula* | are not | good reasoners."†

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* I have said *Camestres* OR FAKORO, and *Celarent* OR FERIO, because "most" cannot designate *absolute* universality, though the present case may be thought to amount to a *moral* one. (See *Note* to No. 15, and UNIVERSALITY, in the Index.)

† For the attainment of skill in syllogizing, as in every other intellectual process, true it is, that "sapere est et principium et fons." Without good sense and some command of expression, it will often be very difficult for a student to state, *in form,* many arguments that are sufficiently conclusive. On the other hand, some proficiency in logic, as an *art,* is essential to the ready performance of this exercise, however simple it may appear. Though good sense and command of expression are indispensable, they are not, of themselves, sufficient. A study, then, which both tries the faculties of the *mind,* and calls into play the resources of *phraseology,* is surely to be considered as worthy of a place in the scheme of a liberal education.

EXERCISES.

Add the proper Symbols to the following Propositions.

1. All grief is mitigated by time. (No. 15.)
2. Some troubles happen to all. (No. 15.)
3. No deceit is justifiable. (No. 15.)
4. Reverence is due to God. (No. 19.)
5. Some virtuous men have been unfortunate.
6. A dissipated character is not estimable. (No. 19.)
7. Many ingenious men have not acquired a reputation. (No. 15.)
8. The rose soon fades. (No. 19.)
9. Alexander was the son of Philip. (No. 11, *note.*)
10. Herodotus is not to be implicitly believed.
11. Few men are acquainted with themselves. (No. 15, *note.*)
12. Sin is necessarily destructive of happiness. (No. 12, *note.*)
13. Every animal is either rational or irrational. (No. 13.)
14. There is no one free from faults. (No. 15.)
15. Rome was the mistress of the world.

16. "Thou art the man."

17. Reading improves the mind. (No. 19.)

18. The Chinese are an idolatrous people. (No. 11, *note.*)

19. Romulus and Remus were twins.

20. If a man be a diligent student, he will become learned. (No. 13.)

21. Every mistake that a man makes is not a sign of folly. (No. 15.)

22. All men have not great abilities.

23. None but classical scholars can fully appreciate the beauties of ancient literature. (No. 15.)

24. "None is lost but the son of perdition."

State the Contraries and Contradictories of the following Propositions. (*No.* 27.)

25. No men are immortal.

26. No conscientious person is deserving of ridicule.

27. All falsehood is dangerous.

28. Every real Christian is charitable.

29. Dishonesty deserves to be punished.

30. Nothing past can be recalled.

31. All who know what is right are bound to practise it.

32. Not one of the enemy escaped.

How, in respect of quantity, is the contradictory of each of the above propositions related to the contrary?

State the Subcontraries and Contradictories of the following Propositions.

33. Some evils are inseparable from a state of mortality.

34. Many apparent misfortunes are real blessings.

35. Several writers of merit have not been popular.

36. All do not admire the same things.—*Hor.*

37. Some men are eager for novelty.

38. Many critics are not candid judges.

39. Few can distinguish between what is really good and evil.—*Juv.*

40. All the hexameters of Virgil are not completed.

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41. No miser is contented.

What is the symbol of this proposition? (No. 17.) Is its simple converse true? (No. 33, or 34.)

42. Some misfortunes are unavoidable.

Add the symbol. What is the contradictory? Is it true or false? (Nos. 26, 27, 28.) What is the

simple converse of the contradictory? Is it true or false? What is the contradictory of the simple converse? How may this be changed into the exposita? (No. 30.)

43. No good man is a liar.

Add the symbol. What is the simple converse? Is it true? (No. 33.) What is the subalternate of the simple converse? (Nos. 24, 27.) How might the exposita be changed into this? (No. 33.)

44. All earthly things are perishable.

Add the symbol. What is the subalternate? Is it true? (No. 28.) What is the simple converse of the subalternate? Is it true? How might the exposita be changed into it? No. 30.)

EXERCISES ON SYLLOGISM, ETC.

45. Swearing is forbidden by our Saviour; swearing is practised in our Courts of Justice; therefore something practised in our Courts of Justice is forbidden by our Saviour.

Is this fallacious? See the Church Articles; also (Nos. 19 and 37, Rule 3.)

46. Hypocrisy is injurious to the interests of religion; ill-directed zeal is often taken for hypocrisy; therefore it is injurious to the interests of religion.

Is the conclusion true? Does it follow? Why? (No. 37, Rule 1.)

47. Covetousness is idolatry; to worship graven images is idolatry; therefore it is covetousness. (No. 37, Rule 3.)

48. No bribery is defensible; bribery is not idleness; therefore idleness is not defensible. (No. 37, Rule 5.)

Is the conclusion true? Does it follow? Why?

49. Mathematical study improves the reasoning powers; the study of logic is not mathematical study; therefore it does not improve the reasoning powers. (No. 37, Rule 4.)

50. Whatever is sinful is productive of sorrow; fraud and revenge are sinful, and poverty deprives us of many comforts; therefore fraud, revenge, and poverty are all productive of sorrow. (No. 37, Rule 2.)

51. Some sins are not malicious; calumny is a sin; therefore it is malicious. (No. 37, Rule 6, and 3.)

52. All luxury is sinful; all luxury is agreeable to the bodily sense; therefore whatever is agreeable to the bodily sense is sinful. (No. 37, Rule 4.)

53. No religious man is factious; St. Paul was a religious man; therefore he was not factious.

What mood and figure? (Nos. 41, 45.)

54. Some vicious pastimes are permitted by law; every vicious pastime is disgraceful to a Christian; therefore something disgraceful to a Christian is permitted by law.

What mood and figure? How reducible? Could you say, "Every thing disgraceful to a Christian is permitted by law?" Why? (No. 37. Rule 4.)

55. No men are free from sin; every one free from sin is the servant of God; therefore some servants of God are not men.

What mood and figure, and how reducible?

56. Whoever winneth souls is wise; all who preach the Gospel faithfully win souls; therefore some who preach the Gospel faithfully are wise.

Has this mood any name? What conclusion might you draw? (No. 44, *note*.)

57. No wicked people enjoy peace of mind; all who have gained riches dishonestly are wicked people; therefore some who have gained riches dishonestly do not enjoy peace of mind.

Is this valid? What is the name of the mood? State the *subalternans* of the conclusion. (No. 44, *note*, and No. 24.)

58. If Roman history is credible, the Carthaginians were a treacherous people; Roman history is credible; therefore the Carthaginians were a treacherous people. (No. 67.)

59. St. Matthew's Gospel is allowed to have been first written either in Greek or Hebrew; Erasmus thought it was not first written in Hebrew; therefore he thought it was first written in Greek. (No. 71.)

60. All parts of Scripture are written for our learning; some dreadful narratives are parts of Scripture; therefore some dreadful narratives are written for our learning.

What mood and figure?

61. Every candid man acknowledges merit in a rival; every learned man does not acknowledge merit in a rival; therefore every learned man is not candid.

What are the quantity and quality of the minor premiss and the conclusion? (No. 15.) What mood and figure? Reduce the syllogism.

62. All earthly projects are liable to disappointment; nothing liable to disappointment should engage our chief concern; therefore something that should engage our chief concern is not an earthly project.

Might you substitute the *subalternans* of the conclusion? In what mood and figure would the syllogism then be?

63. Immoral companions should be avoided; some immoral companions are intelligent; therefore some intelligent persons should be avoided. (No. 19.)

State the mood, figure, and mode of reduction.

64. If the world were good, laws would be useless; but laws are not useless; therefore the world is not good. (No. 67, Rule 2.)

65. If the world were good, laws would be useless; but the world is not good; therefore laws are not useless.

Is this conclusive? Why? (No. 68.)

66. Make a disjunctive syllogism from 2 *Samuel*, xxiv, 13.

67. What sort of proposition is it in *Luke* xvi, 30? Can you make of it a valid syllogism? Which is the *Consequentia?* (No. 65.)

68. If I am blest with opulence, I have reason to be thankful; but I am not blest with opulence; therefore I have no reason to be thankful. (No. 68.)

69. If I am blest with opulence, I have reason

to be thankful; but I have reason to be thankful; therefore I am blest with opulence.

70. Every vicious amusement is unbecoming a wise man; no philosophical pursuits are unbecoming a wise man; therefore some philosophical pursuits are not vicious amusements.

In what figure is this syllogism? The mood?

71. If a proposition be a particular affirmative, shew to what sorts of propositions it cannot belong. Prove this by a syllogism. (No. 71.)

72. The Helvetii, if they went through the country of the Sequani, were sure to meet with various difficulties; and if they went through the Roman province, they were exposed to the danger of opposition from Cæsar; but they were obliged to go one way or the other; therefore they were either sure of meeting with various difficulties, or exposed to the danger of opposition from Cæsar.—*De Bello Gallico, lib.* i. 6.

What sort of argument is this? (No. 75.) Reduce it into simple syllogisms. (No. 77.)

73. This man has been proved treacherous; therefore he is not to be trusted.

What sort of argument? supply the premiss. (No. 80.)

74. If pain is violent, it should be borne with patience, because it will be of short continuance; and if it be slight, it should be borne with patience, because it is only a small evil; but pain must be either violent or slight; therefore it should be borne with patience.

What sort of argument? (No. 74.) What do you call the two incidental propositions in the major premiss? (No. 89.)

75. No woman of great mind would submit to the indignity of being led in triumph; therefore Cleopatra would not.

What sort of argument? Supply the premiss.

76. Our heavenly Father is merciful; therefore we should be merciful.*

77. Alexander was buried; he who is buried becomes dust; what becomes dust is earth; earth is probably made loam; what is probably made loam might probably stop a beer-barrel; therefore Alexander might probably stop a beer-barrel. See *Hamlet, Act* V, *Scene* 1.

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* In supplying the deficient premiss, the strict form of syllogism will be better preserved, if we state the above propositions thus: "To be merciful is a quality of our heavenly Father; therefore it should be ours." (No. 80.)

What sort of argument? Into how many distinct syllogisms may it be expanded, and why? State it in this form. (Nos. 82, 83, and 84.)

78. None but pious men are fit for the priesthood; some ignorant men are pious; therefore some ignorant men are fit for the priesthood.

Is this valid? Why? (No. 15, and No. 37, Rule 3.)

79. None but the truly penitent are pardoned; the malefactor mentioned by St. Luke (ch. xxiii.) was truly penitent; therefore he was pardoned.

Is this conclusion true? Does it follow from the premises? What major proposition does the conclusion require?

80. If man is responsible for his actions, he ought to live circumspectly; if he ought to live circumspectly, he should consider what is his duty; if he should consider what is his duty, it concerns him to seek the will of God; if it concerns him to seek the will of God, he ought to study the holy Scriptures; but man is responsible for his actions; therefore it is incumbent on him to study the holy Scriptures.

What sort of argument? to which division does

it belong, and why? (No. 87.) How could it be changed, so as to fall under the other division? Would the proposition, in that case, be true?

81. All great poets are men of genius; Cicero was a man of genius; therefore he was a great poet. (No. 37, Rule 3.)

82. Opulence is seen, in such a multitude of instances, to harden the heart and to engross the soul, that we might conclude, even without the authority of Scripture, that the rich enter with difficulty into the kingdom of Heaven.

What sort of argument? (No. 88.)

83. Whatever tends to withdraw the mind from pursuits of a low nature deserves to be promoted; classical learning does this, since it gives us a taste for intellectual enjoyments; therefore it deserves to be promoted.

What name is given to such a syllogism as this? Which is the prosyllogism? Which premiss is of itself an enthymeme? (No. 89.)

84. A negro is a fellow-creature; therefore he who injures a negro injures a fellow-creature.*

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* This kind of argument, though not formal, is so obviously valid, that it were a waste of time to expand it into

85. No virtuous man is malevolent; all detractors are malevolent; therefore some detractors are not virtuous.

86. He is brave who conquers his passions: he who resists temptation conquers his passions; therefore he who resists temptation is brave.

87. All the ships that sailed to Troy, contained, probably, 100,000 men; the ship of Nireus was one of these; (Il. B. 671.) therefore it probably contained 100,000 men. (No. 37, Rule 3. See FALLACIÆ, in the Index.)

88. Somebody must obtain the high prize in every lottery; each individual who holds a ticket is somebody; therefore each individual who holds a ticket must obtain the high prize. (No. 37, Rule 3.)

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syllogisms. It will be found to rest upon the general principle, that whatever stands in any relation to an individual or species, bears the same relation to a part of any class or predicable which comprehends that individual or species. E. G. "What stands in any relation to the species 'Negro,' bears the same relation to the predicable, 'Fellow-creature,' which comprehends the species 'Negro;' he who injures a 'Negro,' stands in a relation to the species 'Negro,' therefore he who injures a 'Negro,' bears the same relation to the predicable, 'Fellow-creature,' which comprehends the species 'Negro.'"

89. Sticks are easily broken; fagots are sticks; therefore fagots are easily broken. (No. 37, Rule 3.) See FALLACIÆ, in the Index.

90. Books are a source both of instruction and pleasure; the Iliad and Odyssey are books; therefore they are a source both of instruction an pleasure. (No. 19, No. 37, Rule 3.)

INDEX AND VOCABULARY.

ABSOLUTE *Noun*, or *Term*, See TERM.

ABSTRACT *Noun*, or *Term*, See Term.

ABSTRACTION, the process by which we draw off, in thought, from a notion, any circumstances we do not purpose to consider. By this process generalization is performed.

ACCIDENT, a predicable *contingently* joined to the essence of the species, and which may, therefore, be absent or present, the essence of the species remaining the same; as, "A man *walking*," "A man *born at Paris*." The former is called a *separable* accident, because it may be separated from the individual; the latter is plainly *inseparable*. Accident is predicated in *Quale*. See SPECIES.

ACCIDENTAL DEFINITION, See DEFINITION.

ANALOGOUS *Words* or *Terms*, See WORDS.

ANTECEDENT, No. 65.

APPREHENSION, *Simple*, one of the three operations of the mind concerned in argument. The notion of any object in the mind. It is either *Incomplex* or *Complex*. See OPERATIONS.

APPREHENSION, *Simple Incomplex*, the notion of one object, as, "A pen," or of several objects confusedly and without any relation, as, "Pens."

APPREHENSION, *Simple Complex*, the notion of two or more objects between which there is some relation, as, "A pen in the hand."

ARGUMENT, an act of reasoning expressed in language; popularly speaking, the means by which some point is proved.

CANONS *of Syllogisms*, No. 36.

CATEGOREMATIC *Word*, or CATEGOREM, from κατηγορέω, I predicate, a word that may be employed by itself as a term. Such words are also called *Simple terms.*

CATEGORIES *of Aristotle*, or *Ten Predicaments.* General heads, to one or more of which every term may be referred, viz. οὐσία, πόσον, ποῖον, πρόστι, ποιεῖν, πάσχειν, ποῦ, πότε, κεῖσθαι, ἔχειν. Substance, quantity, quality, relation, action, passion, (or suffering,) place, time, situation, possession, (or covering.)

CAUSE, *Divisions of*, 1st. *Efficient, (à quâ,)* either *Principal*, as the *shoemaker*, *by whom* the shoe is made; or *Instrumental*, as the *awl*, *knife*, &c. *with which* the shoe is made. 2nd. *Material, (ex quâ,)* either *Proximate*, as the *leather of which* the shoe is made; or *Remote*, as the *skin of which* the leather is made. 3rd, *Formal, (per quam,)* either *Proximate*, as the *shape* or *fashion* of the *shoe;* (because the material so shaped becomes a shoe;) or *Remote*, as the *natural form* of the *leather* (viz. that which is essential to its being leather) is the more remote form of the shoe. 4th. *Final; (propter quam;)* denoting the *end for which* a thing is made or done; either *Proximate*, as the proximate end for which a shoe is made, is the *protection of the foot;* or *Remote*, as its more remote end is the comfort and health of the body.

COMMON *Term*, See TERM.
COMPATIBLE *Terms*, see TERM.
COMPLEX *Term*, the same as PROPOSITION.
CONCLUSION *of a Syllogism*, No 37, Rule 2nd.
CONCRETE *Noun*, See TERM.
CONDITIONAL *Propositions*, Rules for drawing a conclusion from, No. 67.
CONDITIONAL *Syllogisms*, No. 65, *et seq.*
CONSTRUCTIVE *Conditional Syllogisms*, No. 67.
CONTINGENT *Matter*, Nos. 18 and 19.
CONTRADICTION, *in Logic*, when any proposition is opposed by another, differing from it both in quantity and quality, No. 22.
CONTRADICTORY *Opposition of Terms*, See TERM.
CONTRADICTORY Propositions, Nos. 22, 23, and 27.
CONTRARY *Propositions*, Nos. 22, 27.
CONTRARY *Terms*, see TERMS.
CONVERSE, Nos. 29, 31, 32.
CONVERSION *of Propositions*, No. 29.
CONVERSION *Simple*, No. 30.
CONVERSION *per Accidens*, or *by Limitation*, No. 30.
CONVERSION *by Negation*, or *Contraposition*, No. 30.
COPULA, No. 6.
DECOMPLEX, or *doubly complex*, *Word* or *Term*. The same as SYLLOGISM, No. 2.
DEFINITION, such an explanation of a term, as separates it, like a boundary, from every thing else. Definition is divided into, 1st. *Nominal*, which explains only the meaning of the *Term*, by an equivalent expression that may happen to be better known, as "Decalogue," "ten commandments;" or 2nd. *Real*, which explains the nature of the *Thing*. These divisions are again divided into *Essential* and *Acci-*

dental; and essential definition is further divided into *physical* and *logical*, (or *metaphysical*.)

DEFINITION, *Essential*, one which assigns the constituent parts of the essence or nature; either the *real* parts of the essence, which are *actually separable*, as if, in defining "Plant," you should enumerate the leaves, stalks, roots, &c. which is a *physical* definition; or the *ideal* parts, which are *separable only in the mind*, as when a plant is defined to be "an organized being, destitute of sensation," which is a *logical* or *metaphysical* definition. N. B. A *logical* definition must always consist of the *genus* and *differentia*.

DEFINITION, *Accidental*, commonly called a *Description;* that definition of a thing which is given by assigning to it the circumstances *belonging* to its essence; viz. Properties and Accidents; (causes, effects, &c.) E. G. "Barometer," "A machine for measuring the weight of the atmosphere." "Balloon," "A silken ball, filled with gas, which causes it to rise into the air." "Lion," "The fiercest and most noble of quadrupeds," &c.

DEFINITION, *three principal Rules for*. 1st. A definition must be adequate, *i.e.* neither too narrow nor too extensive. If it be too narrow, you explain *a part* instead of *a whole;* if too extensive, *a whole* instead of *a part*. 2nd. It must be of itself clearer (*i.e.* consist of ideas less complex) than the thing defined. 3rd. It must be couched in just a sufficient number of proper words. *Proper* is here used in opposition to *metaphorical*, which class of words is excluded on account of their vague and *indefinite* nature.

DESCRIPTION, see DEFINITION ACCIDENTAL.

DESTRUCTIVE *Conditional Syllogisms*, No. 67.

DICTUM *of Aristotle*, *De omni et nullo*, No. 35.

DIFFERENCE, *Differentia*, a Predicable expressing the distinguishing part of the essence of a species, "Rational" is the *Difference* of "Man." It is predicated in *Qualequid*, see SPECIES.

DIFFERENCE, *Generic*, the difference of a subaltern genus, and which may be predicated of all the subordinate species comprehended in that genus. "Having sensation" is the generic difference of "Animal."

DIFFERENCE, *Specific*, the difference of an *infima Species*, and which may be predicated of all the individuals contained under it. "Rationality" is the specific difference of "Man."

DILEMMA, Nos. 72, 73.

DILEMMA, *Simple Constructive*, No. 74.

DILEMMA, *Complex Constructive*, No. 75.

DILEMMA, *Destructive*, No. 76, and *note*.

DISCOURSE, the same as REASONING.

DISJUNCTIVE *Syllogisms*, Nos. 69, 70, 71.

DISTRIBUTED, *Meaning of*, No. 16.

DISTRIBUTION, *Rules concerning*, No. 20.

DIVISION, *in Logic*, is a metaphorical expression, and means the distinct enumeration of several things signified by one common name. You reverse the process of generalization, and add on, instead of drawing off, the differences by which things are distinguished. Thus, "Tree" is logically divided into "Oak," "Elm," "Poplar." There is this difference between logical and physical division. (See INDI-

VIDUAL.) In the former, you may predicate the divided whole of every dividing member. Thus, "Weapon" may be predicated of "Sword," "Pike," "Gun." This cannot happen in the case of physical division. "Gun" cannot be predicated of "the Lock," "the Stock," or "the Barrel."

DIVISION, *Rules for logical*, are *three*. 1st, Each of the parts, or any, short of all, must contain less (*i. e.* have a narrower signification) than the thing divided. "Weapon" could not be a division of the term "Sword." 2nd. All the parts together must be exactly equal to the thing divided. In dividing the term "Weapon," into "Sword," "Pike," "Gun," &c. we must not omit any thing of which "Weapon," can be predicated, nor introduce any thing of which it cannot. 3rd. The parts or members must be *opposed; i. e.* must not be contained in one another. "Book" must not be divided into "Quarto," "French," for a French book may be a quarto, and a quarto, French. N.B. You must always keep in mind the *Principle of Division*, with which you set out; E.G. whether you begin to divide books according to their *size*, *language*, *matter*, &c.

ENTHYMEME, Nos. 80, 81.

EPICHIREMA, No. 89.

EQUIVALENTS, No. 90.

ESSENCE, the nature of any being, whether actually existing or not; "Snow" has an *essence* in summer; in winter, it has existence also.

EXPOSITA, *what*, No. 30.

EXTREMES, No. 7, and *note*, and No. 37, *note*.

FALLACY, an argument, or apparent argument, profess-

ing to decide the matter at issue, while it really does not.

Fallacia Æquivocationis, arising from the use of an equivocal word; E. G. "The dog is an animal; Sirius is the dog; therefore Sirius is an animal." See No. 37, Rule 3rd.

Fallacia Amphiboliæ, or *doubtful Construction;* E. G. "Quod tangitur à Socrate illud sentit; columna tangitur à Socrate; ergo columna sentit." In the major proposition, "sentit" means "he, *i. e.* Socrates, feels." In the conclusion, the same word means "feels Socrates." See No. 37, Rule 1st.

Fallacia Compositionis, when what is proposed in a *divided* sense is afterwards taken *collectively;* E. G. "Two and three are even and odd; five is two and three; therefore five is even and odd." See No. 37, Rule 3rd.

Fallacia Divisionis, when what is proposed in a *collective*, is afterwards taken in a *divided* sense; E. G. "The planets are seven; Mercury and Venus are planets; therefore Mercury and Venus are seven." See No. 37, Rule 3rd.

Fallacia Figuræ Dictionis, when, from any similitude between two words, what is granted of one is, by a forced application, predicated of another; as, "Projectors are not fit to be trusted, therefore he who has formed a project is not fit to be trusted" —*See Dr. Whately's Logic, ch.* iii. § 8.

Fallacia Accidentis, when what is accidental is confounded with what is essential; E. G. "What you bought you have eaten; raw meat is what you bought; therefore raw meat is what you have

eaten." In the major proposition, "What you bought" means *as regards its Essence;* in the minor, *as regards its Accidents.* See No. 37, Rule 3rd.

FALLACIA A DICTO SECUNDUM QUID AD DICTUM SIMPLICITER, when a Term is at one time used in a limited, at another, in an unlimited sense, as, "The Ethiopian is *white as to his teeth;* therefore he is *white.*" See No. 37, Rule 1st.

FALLACIA IGNORATIONIS ELENCHI, an argument that indicates ignorance of the point in dispute; an irrelevant conclusion; as if any one, to shew the inutility of the art of Logic, should prove that men unacquainted with it have reasoned well.

FALLACIA A NON CAUSA PRO CAUSA, which is divided into *Fallacia à non verâ pro verâ*, and *Fallacia à non tali pro tali.* E.G. "A comet has appeared, therefore there will be war."—"What intoxicates should be prohibited, and wine intoxicates." The abuse of it does. In replying, you should deny the false cause, or assign the true one.

FALLACIA CONSEQUENTIS, when that is inferred which does not logically follow; as, "He is an animal; therefore he is a man."

FALLACIA PETITIONIS PRINCIPII, (*begging the Question,*) when that is assumed for granted, which ought to have been proved; as when a thing is proved *by itself*, (called *Petitio statim,*) "He is a man, therefore he is a man;" or *by a Synonym*, as, "A sabre is sharp, therefore a cymetar is;" or *by any thing equally unknown*, as, "Paradise was in Armenia, therefore Gihon is an Asiatic river;" or *by any thing more unknown*, as, "This square is twice the size of this triangle, because equal to this circle;" or *by*

discoursing in a circle, i. e. when the disputant tries to prove reciprocally conclusion from premises, and premises from conclusion; as, "Fire is hot, therefore it burns;" and afterwards, "Fire burns, therefore it is hot."

FALLACIA PLURIUM INTERROGATIONUM, when two or more questions, requiring each a separate answer, are proposed as one; so that if *one* answer be given, it must be inapplicable to *one* of the particulars asked; as, "Was Pisistratus the usurper and scourge of Athens?" The answer "No" would be false of the former particular, and "Yes" would be false of the latter. This fallacy is overthrown by giving to each particular a separate reply.

FALSE, *strictly*, denotes the quality of a proposition which states a thing *not as it is*.

FIGURES, Nos. 41 and 48.

GENERALIZATION, the abstracting or drawing off, in thought, the points of dissimilitude between several objects which resemble each other in some part of their nature, and the assigning to them one *common name* expressive of the particulars in which they all agree. Thus, "Pigeon," "Wren," "Eagle," "Cassowary," differ in *shape*, *plumage*, *size*, &c. but agree in being all *feathered creatures*. They come, therefore, under the general head of "Fowl," or "Bird."

GENERIC DIFFERENCE, See DIFFERENCE.

GENERIC PROPERTY, See PROPERTY.

GENUS, a Predicable, expressing the common or material part of the species of which it is affirmed. "Animal" is the genus of "Man." It is said to be predicated in *Quid*. See SPECIES.

GENUS, *Proximum*, one that is the next remove from a species. "Animal" is the *proximum genus* of "Man." "Living thing" is the *more remote* genus.

GENUS, *Subaltern*, one that is a species, if viewed with reference to a higher or more comprehensive genus; thus "Bird," the *genus* of *nightingale*, is a *species* of *animal*.

GENUS, *Summum*, that which is not a species of any higher genus.

HYPOTHETICAL *Propositions*, See PROPOSITIONS.

HYPOTHETICAL *Syllogisms*, No. 63, 64, 76, 87.

IDEA, the picture or representation of an object in the mind; the result of apprehension.

ILLATIVE, *Meaning of*, No. 31.

ILLICIT PROCESS, No. 37, Rule 4.

IMPOSSIBLE MATTER, Nos. 18 and 19.

INDEFINITE PROPOSITION, See PROPOSITION.

INDIVIDUAL, that which is incapable of *logical* division, (see DIVISION,) and can be only *physically* divided into its *parts*. E.G. "Man," being a species, can be *logically* divided into *individuals*, as "Homer," "Virgil," "Milton;" but these, being individuals, can be divided only *physically*, viz. into their component parts.

INDUCTION, No. 88.

INFER, to draw a conclusion from granted premises.

INFIMA SPECIES, See SPECIES.

INFINITANT PARTICLE, "Not."

JUDGMENT, a decision on the agreement or disagreement of two objects. It is either affirmative or negative. See OPERATIONS.

Logic, the *science* which analyzes the process of the mind in reasoning; the *art* which lays down rules to secure the mind from erroneous inferences. (From λόγος, reason.)

Major Premiss, No. 37, Rule 2; No. 64.

Major Term, No. 37, Rule 1.

Matter *of a Proposition, what*, No. 19.

Middle Term, No. 37, Rule 1. No. 1, *Note.*

Minor Premiss, No. 37, Rule 2. No. 64.

Minor Term, No. 37, Rule 1.

Modal Syllogisms, Nos. 60, 61, 62.

Moods, No. 40, No. 48.

Necessary Matter, Nos. 18 and 19.

Negative Term, See Term.

Operations *of the mind*, concerned in argument are three; viz. Simple Apprehension, Judgment, Discourse, (or Reasoning.)

Opposite Term, see Term.

Opposition *of Propositions*, Nos. 21, 22, 27.

Opposition *of Terms*, See Terms.

Pars deterior, *what*, No. 38, Note.

Positive Term, See Term.

Predicable, See Term Common. Every Predicable expresses either the *whole* essence of its subject, viz. the species; or *part* of its essence, viz. the genus or the difference; or something *joined* to its essence, viz. a property or an accident.

Predicate, No. 6.

Premiss, a proposition employed to establish some conclusion, No. 4.

Privative Term, See Term.

Problem, the same as Question.

PROPERTY, a Predicable expressing something necessarily joined to the essence of the whole species; whatever may be considered as the accompaniment or result of the *differentia*. "Risibility" is the property of "Man." Property is predicated in *Quale*. See SPECIES.

PROPERTY, *threefold division of*.—1st, Universal and peculiar; as, the *faculty of laughter* or *of speech*, to *man*. 2nd, Universal, but not peculiar; as, *the being a biped*, to *man*. *Every man* is a *biped*, but fowls are bipeds too. 3rd, Peculiar, but not universal, as, *the being a philosopher*, to *man*. Man *alone* can be a philosopher, but *every* man *is not* one. This third division, however, is more truly an *accident*.

PROPERTY, *Generic*, the property of a subaltern genus, and which may be predicated of all the subordinate species comprehended in that genus. "Voluntary motion" is the generic property of "Animal."

PROPERTY, *Specific*, the property of an *infima species*, and which may be predicated of all the individuals contained under it. "Risibility" is the specific property of "Man."

PROPOSITIO DE INESSE, *what*, No. 11, *Note*.

PROPOSITION, an act of judgment expressed in language, See No. 6.

PROPOSITION, *Affirmative*, Nos. 11 and 14.

PROPOSITION, *Categorical*, (*pure* and *modal*,) Nos. 11 and 12.

PROPOSITION, *Hypothetical*, (*conditional* and *disjunctive*,) Nos. 11 and 13.

PROPOSITION, *Indefinite*, No. 11, *Note*. No. 19.

PROPOSITION, *Negative*, Nos. 11 and 14.
PROPOSITION, *Particular*, Nos. 11 and 15.
PROPOSITION, *Singular*, No. 11, *Note.*
PROPOSITION, *Contrary*, Nos. 22 and 27.
PROPOSITION, *Subcontrary*, Nos. 22 and 27.
PROPOSITION, *Contradictory*, Nos. 22, 23, and 27.
PROPOSITION, *Subaltern*, Nos. 22 and 27.
PROPOSITION, *Universal*, Nos. 11 and 15.
PROSYLLOGISM, No. 89.
PROVE, to adduce premises which establish the truth of some conclusion.
QUALITY *of a Proposition*, No. 11.
QUANTITY *of a Proposition*, No. 11.
QUESTION, the Proposition to be proved; called, after proof, the *conclusion* or *inference.*
REASONING, the act of proceeding from one judgment to another, founded on, or the result of it.
REDUCTION, *Ostensive*, Nos. 52, 53, 56.
REDUCTION *of Hypothetical Syllogisms*, No. 79.
RELATIVE NOUN or TERM, See TERM.
SIGNIFICATE, No. 16.
SORITES, Nos. 82, 83, 84, 85, 86.
SORITES, *Hypothetical*, No. 87.
SPECIES, a Predicable expressing the whole essence of several things; as, "Man," A species of animal. It is said to be predicated in *Quid*, i. e. to answer to the question *What?* as, "What is that?" *Answ.* "A man." N.B. By adding the difference to the genus, you make up the species.
SPECIES INFIMA, one that cannot be considered as the genus of any thing, and contains under it only individuals. "Man," is an *infima species*, containing under it, Cæsar, Aristotle, Thomas, &c.

SPECIES SUBALTERN, the same as subaltern genus; i.e. one that is a genus, if viewed with reference to the species into which it is divisible. "Bird" is a *subaltern species*, being a *species* of *animal*, and the *genus* of *nightingale*.

SPECIFIC DIFFERENCE, See DIFFERENCE.

SPECIFIC PROPERTY, See PROPERTY.

SUBALTERN PROPOSITIONS, See PROPOSITIONS.

SUBALTERNANS, No. 24.

SUBALTERNATE, No. 24.

SUBCONTRARY PROPOSITIONS, See PROPOSITIONS.

SUBJECT, No. 6.

SUBSTANCE *of a Proposition*, No. 11.

SYLLOGISM, No. 2, No. 35.

SYLLOGISMS, *Division of*, viz. Categorical, into Pure and Modal; Hypothetical, into Conditional and Disjunctive. No. 5.

SYLLOGISMS, *Irregular*, Nos. 91, 92, 93, and 94.

SYLLOGISMS, *Rules for ascertaining the validity of*, No. 37.

SYMBOLS of *Quantity* and *Quality*, No. 17, No. 45.

SYNCATEGOREMATIC WORD, or SYNCATEGOREM, (*συγκατηγορέω*, I predicate together with,) a word that can form only part of a term. Such are the particles of a language, and substantives in an oblique case. Adjectives and participles are generally accounted *Syncategorems*.

TERM, an act of apprehension expressed in language. Also, the subject or predicate of a Proposition, No. 7.

TERM, *Absolute*, one that is considered by itself, and conveys no idea of relation to any thing of which it is a part, or to any other part distinguished from it.

TERM, *Abstract*, denotes the quality of a being, without regard to the subject in which it is; as, "Justice," "Height," "Wisdom." Abstract terms are nouns substantive.

TERM, *Common*, such as stands for several individuals, which are called its *Significates;* as "Man," "City." Such terms, and such only, can be affirmatively predicated of several others, and they are therefore called *Predicables.*

TERMS, *Compatible* or *Consistent*, express two views which *can* be taken of the same object, at the same time, as, "White and Hard."

TERM, *Complex*. The same as PROPOSITION.

TERM, *Concrete*, denotes the quality of a being, and either expresses, or must be referred to, some subject in which it is; as, "Fool," "Foolish," "High," "Wise." Concrete Terms are usually, but not always, nouns adjective.

TERMS, *Contradictory Opposition of*, when they differ only in respectively wanting and having the particle "not," or its equivalent. *One or other* of such terms is applicable to *every* object.

TERMS, *Contrary*, come both under some one class, but are the *most different* of all that belong to that class; as, "Wise" and "Foolish," both coming under the class of mental qualities. There are some objects to which neither of such terms is applicable; a Stone, for instance, is neither wise nor foolish.

TERM, *Definite*, *(finitum,)* one which marks out an object or class of beings; as, "Cæsar," "Corporeal." *Positive* Terms are called *definite.*

TERM, *Indefinite*, *(infinitum,)* one which does not *mark out*, but only *exclude* an object, as, "Not-Cæsar," "Incorporeal." *Privative* and *negative* Terms are called *indefinite*.

TERM, *Negative*, denotes that the positive view *could not* be taken of the object; it affirms the absence of a thing from some subject in which it *could not* be present; as, "A dumb statue;" (you could not say, "A speaking one.") "A lifeless corpse;" (you could not say, "A living one.") N. B. The same term may be negative, positive, or privative, as it is viewed with relation to contrary ideas. Thus "Immortal" is privative or negative, viewed with relation to *Death*, and positive, viewed with relation to *Life*.

TERMS, *Opposite*, express two views which cannot be taken of one single object at the same time; as, "White and Black."

TERM, *Positive*, denotes a certain view of an object, as being actually taken of it; as, "Speech," "A man speaking."

TERM, *Privative*, denotes that the positive view *might* conceivably be taken of the object, but *is not;* "Dumbness," "A man silent;" (you might say, "A man speaking.") "An unburied corpse;" (you might say, 'A buried one.")

TERM, *Relative*, that which expresses an object viewed in relation to the whole, or to another part of a more complex object of thought, as "Half" and "Whole," "Master" and "Servant." Such nouns are called *Correlative* to each other; nor can one of them be mentioned, without a notion of the other being raised in the mind.

TERM, *Simple*. The same as CATEGOREMATIC WORD.

TERM, *Singular*, such as stands for one individual, as "Socrates," "London," "This man," "That city." Such terms cannot be predicated affirmatively of any thing but themselves.

UNDISTRIBUTED MIDDLE, No. 37, Rule 3.

UNIVERSALITY *of a Proposition*. A Proposition is *metaphysically* or *mathematically* universal, when the predicate belongs, without any exception, to every particular contained under the universal subject; as, "All circles have a centre and circumference." It is *physically* universal, when it always agrees, unless in the case of some unnatural exceptions; as, "All men are rational." It is *morally* universal, when it agrees in most instances, but not necessarily, or in the course of nature; as, "All the Cretans are liars."

WORDS, any combination of, making one complex apprehension, is, in logic, a *simple word*; as, "⌈The-hope-of-reward⌉ ⌈is⌉ ⌈the-solace-of-labour.⌉" Every Proposition consists of three simple Words, viz. subject, copula, and predicate.

WORDS, *Various divisions of the manner of employing*; whence a word is called *Univocal*, *Equivocal*, *Analogous*, *of the first Intention*, *or of the second Intention*.

WORDS, *Univocal*, such as are confined to one meaning, and signify but one sort of idea; E.G. "Book," "Lance," "Tomb."

WORDS, *Equivocal*, such as signify two or more ideas; E. G. "Light," "Moor," "Pen," "Post."

WORDS, *Analogous*, such as signify two or more things that have no resemblance *in themselves*, but stand in a similar relation each to its respective object; E.G. "Hand," "Foot," "Sweet." As the *human hand points to* any object to which we would direct the attention, so does the *hand of a clock point to* the hour. As the *foot of an animal* is *the lowest part of it*, so is the *foot of a mountain* with relation to the mountain, &c.

WORDS, *of the first Intention*, such as are used in their vague and common acceptation; thus "Needle" signifies, in popular language, the *little steel instrument used in sewing.*

WORDS, *of the second Intention*, those to which a more precise and limited meaning is given, proper to some particular art, science, or system; thus "Needle" means, in the language of navigation, the *little steel bar in the mariner's compass.*

APPENDIX.

ON ACADEMICAL DISPUTATION.

THE Respondent, in a Disputation, being always supposed to maintain a true proposition, the argument of the Opponent, whose province it is to support the contradictory, must be presumed to be founded on some fallacy.

If the respondent, upon trying his opponent's objection in the form of a categorical syllogism, should find that it offends against any one of the six rules in No. 37, by pointing out such a violation, he overthrows the opponent's argument.

Should the objection be hypothetical, the respondent must examine the connexion between antecedent and consequent, (No.66,) and whether the

two rules at No. 67 have been observed. The detection also of any violation of the rules for drawing a conclusion from disjunctive propositions (Nos. 70, 71,) will destroy a fallacy so supported.

Fallacies that consist in a violation of the express rules of logic are more palpable than those which depend on the ambiguity of the middle term; by an ingenious application of which to the terms of the question, (No. 37, Rule 1,) fallacies are very generally introduced.

Most frequently, therefore, the first business of the respondent is to examine the middle term of his opponent's argument; and ascertain whether, in his comparison of it with the terms of his conclusion, he has used it in exactly the same sense in both instances. The first and second intention of words, their being employed sometimes in a literal, and sometimes in a metaphorical, sense, with other considerations arising from the various meanings attached to the same, or similar, terms, afford a wide scope for the exercise of fallacy, and call for acuteness, both natural and acquired, to detect it, if skilfully concealed.

The opponent has the choice of many points of

attack; for if he prove that the proposition advanced by the respondent appears at all inconsistent with any part of the system he is defending, or at variance with any received principle of truth, &c. or expressed in terms of too extensive a latitude,—by driving the respondent to explain such a difficulty, he has fairly executed his task.

The Cambridge argument now practised by the opponent at a public disputation in the schools, generally consists of three constructive conditional syllogisms (No. 67.) The consequent (No. 65) in the first syllogism, is always, "Cadit quæstio." If the respondent should deny the consequence, (or conclusion,) then the consequent of the second syllogism will be, "Valet consequentia;" on the contrary, if he should deny the minor, (No. 64,) the consequent of the second syllogism will be, "Valet minor." If the respondent should deny the consequence of the second syllogism, the consequent of the third will be, "Valent consequentia et argumentum;" if he should deny the minor of the second, the consequent of the third will be, "Valent minor et argumentum."

Whichever proposition the respondent has de-

nied, (whether it be the minor or consequence,) the opponent, in his next syllogism, affirms to be valid; taking for the consequent of his major proposition, "Valet minor," or "Valet consequentia," as the case may be.

Should the argument consist of only two syllogisms, the former will have for its consequent "Cadit quæstio," and the latter, either "Valent consequentia et argumentum," or "Valent minor et argumentum," according to the previous denial of the respondent. Should it consist of more than three, all, except the last, will have their consequent in the same manner as the second; either "Valet consequentia," or "Valet minor." The consequent of the concluding syllogism is always, "Valent consequentia et argumentum," or, "Valent minor et argumentum." It is not, however, advisable to use more than three syllogisms in constructing an argument for a disputation.

It is the duty of the respondent, at the close of each syllogism, either to concede or deny the minor proposition, as circumstances may require. If it be evidently true, he must, of course, concede it, but deny the consequence; viz. that its truth inva-

lidates the question he is maintaining; "Concedo minorem, et nego consequentiam." If the minor be false, or doubtful, he denies it, ("Nego minorem,") and the opponent, on the other hand, must endeavour to establish it by some unquestionable medium of proof.

The following examples, exhibiting arguments of three, four, and two syllogisms, and shewing the mode of proceeding, as the minor or consequence may be denied in different places, will facilitate the application of the above remarks. The *Form* of the argument being at present the point for consideration, unmeaning symbols have been substituted for terms.

An Argument of three syllogisms, with the minor of the first denied.

OPPONENS.

MAJOR PROPOS.

Antecedent. *Consequent.*

1. Si | A sit B, | | cadit quæstio; |

MINOR PROPOS.

Sed A est B;

CONSEQUENTIA.

Ergo cadit quæstio.

RESPONDENS.

Nego minorem.

Pergit Dominus OPPONENS *ad syllogismum secundum.*

2. Si C sit D, valet minor;
Sed C est D;
Ergo valet minor.

RESPONDENS.

Concedo minorem, et nego consequentiam.

Pergit OPPONENS *ad syllogismum tertium.*

3. Si E sit F, valent consequentia et argumentum;
Sed E est F;
Ergo valent consequentia et argumentum.

An Argument of three syllogisms, with the minor of the second denied.

OPPONENS.

1. Si A sit B, cadit quæstio;
Sed A est B;
Ergo cadit quæstio.

RESPONDENS.

Concedo minorem, et nego consequentiam.

OPPONENS *pergit ad syllogismum secundum.*

2. Si C sit D, valet consequentia;
Sed C est D;
Ergo valet consequentia.

RESPONDENS.

Nego minorem.

OPPONENS *pergit ad syllogismum tertium.*

3. Si E sit F, valent minor et argumentum;
Sed E est F;
Ergo valent minor et argumentum.

An Argument of four syllogisms, with the minor of the second denied.

OPPONENS.

1. Si A sit B, cadit quæstio;
Sed A est B;
Ergo cadit quæstio.

RESPONDENS.

Concedo minorem, et nego consequentiam.

Pergit OPPONENS.

2. Si C sit D, valet consequentia;
Sed C est D;
Ergo valet consequentia.

RESPONDENS.

Nego minorem.

Pergit OPPONENS.

3. Si E sit F, valet minor;
Sed E est F;
Ergo valet minor.

RESPONDENS.

Concedo minorem, et nego consequentiam.

Pergit OPPONENS.

4. Si G sit H, valent consequentia et argumentum;
Sed G est H;
Ergo valent consequentia et argumentum.

N. B. If the minor of the third syllogism had been denied, the consequent and conclusion of this last syllogism would have been, "Valent minor et argumentum."

An Argument of two syllogisms, with the minor of the first denied.

OPPONENS.

1. Si A sit B, cadit quæstio;
   Sed A est B;
   Ergo cadit quæstio.

RESPONDENS.

Nego minorem.

Pergit OPPONENS.

2. Si C sit D, valent minor et argumentum;
   Sed C est D;
   Ergo valent minor et argumentum.

Should the minor of a concluding syllogism be false, the respondent does not say, "Nego minorem," but proceeds at once to his reply.

The antecedent, as may be seen in the preceding examples, is first enunciated in the subjunctive, or, at least, conditionally; then affirmed, in the minor premiss, in the indicative mood, and the consequent accordingly established.

It may happen, that the three conditional syllogisms admit of being reduced to the form of a single

categorical syllogism; to the major, minor, and conclusion of which they severally correspond. But even in instances of this kind, it is not necessary that the three conditional syllogisms should be placed in the same order as the three propositions of the categorical syllogism, if the opponent thinks that, by a different arrangement, his sophism will be the better concealed.

The three conditional syllogisms of an opponent's argument, when they do not correspond with the three propositions of a categorical syllogism, would require, in order to be stated in form, to be expanded into two or more categorical syllogisms.

In responding to an opponent, it is by no means necessary to unfold in one's mind the objections he has adduced into as many strict categorical syllogisms as will lead to his conclusion; for this would often be a trifling and tedious process to the respondent; though it is highly desirable to possess the skill that would enable him, if required, to go through it.

Should the respondent, from the subtlety of his opponent's sophism, or any other cause, experience great difficulty in discovering the pith of the objection, the Moderator usually assists him, by re-

stating the opponent's argument in a more lucid and intelligible form; and sometimes directing his attention to the quarter in which the fallacy is hidden.

It has been already stated to be the opponent's province, should the respondent deny the minor of his syllogism, to confirm it by some medium of proof. This, in the Divinity School, is generally done by an appeal to texts of Scripture; which, it may be observed, are commonly cited without being called for by the respondent, as they often afford ground for critical animadversion on the part of the professor, and opportunity for a further trial of the skill and knowledge of the disputants.

It is usual for the professor to call on the respondent for an interpretation into Latin of the more abstruse and difficult texts of the New Testament, that may happen to be quoted by the opponent. For citations from the Old Testament, the Vulgate is employed.*

When the respondent has replied to the opponent's objection, the moderator occasionally demands

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* A copy of the Greek New Testament, and of the Vulgate version of the Old, are placed on the desk of the respondent's rostrum.

of the latter his own solution of the sophism he has constructed.

The following is the form of a divinity Act, with a specimen of the style of argumentation, as practised in the University of Cambridge. The compiler, in conformity with the principles laid down in the preceding part of this manual, has, at the bottom of the page, unfolded each argument in a categorical form.

The preliminaries of a divinity act, the formula of the prayers, the habit of the respondent, &c. are detailed in the "Ceremonies of the University of Cambridge," edited by H. Gunning, Esq.

Every one about to keep a divinity act first submits to the Regius Professor three or four questions, which should be on some important doctrine of the Christian religion, or leading article of the Protestant faith. The professor having selected one of these questions, the respondent (that is to be) makes it the subject of a Latin thesis: the delivery of which ought not to occupy more than half-an-hour.*

* The Church Articles supply suitable subjects for disputation. A good list of questions that have been already discussed is to be found in the Preface to Bishop Watson's Theological Tracts.

About ten days before the act is kept, the respondent should wait on the professor, in order to obtain of him the second question. This is always chosen exclusively by the professor himself, who, when the disputation is ended, delivers a thesis (called a *Determination)* upon it. It is the province of the respondent to answer the arguments brought against both questions.*

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* It is greatly to be regretted, that many clergymen, after entering on the public duties of their office, should often neglect to cultivate the advantages conferred on them by a University education. Not that it is desirable, or even defensible, that a minister of the Gospel should employ much of his time either in classical or philosophical researches; but some familiarity with *theological* Greek and Latin might fairly be expected of every divine, however arduous the duties of his parish may be. It is incredible how much time may be snatched for improvement out of the busiest and most laborious life. Erasmus wrote his "Praise of Folly," while travelling on horseback into Italy; "ne totum illud tempus quo equo fuit insidendum, illiteratis fabulis tereretur."

No one who has discontinued for many years a moderate cultivation of Greek and Latin, can proceed to the higher degrees at the University, without disagreeable anticipations of embarrassment and disgrace, in the attempt to hold a public disputation.

The writings of Limborch may be very useful to any one preparing for a divinity act.

On the professor having ascended his rostrum, he directs the respondent to begin: "Agas, Domine." The respondent then says, "Oremus," and pronounces the prayer "Actiones nostras," &c. He afterwards proposes the questions thus:

"*Quæstiones sunt: (exempli gratiâ:)*

1. '*Oblatio Christi semel facta perfecta redemptio est.*'

2. '*Fides justificans non potest à bonis operibus disjungi.*'"

As the question on which the respondent has composed his thesis is always proposed first, he then says, "De priori," and proceeds to deliver his thesis.

When the thesis is concluded, the first opponent is directed by the professor to ascend the rostrum: "Ascendat opponentium primus."

The opponent then reads the two questions, as the respondent had done before, and proceeds to his arguments.

To give as clear an idea as possible of the manner of opposing and responding, the discussion of the first argument is here exhibited in the form of dialogue.

OPPONENS.

Contra priorem.

1. Si Divus Paulus Christum appellet, "Agnum nostrum paschalem," cadit quæstio;

Sed Divus Paulus Christum appellat, "Agnum nostrum paschalem;"

Ergo cadit quæstio.

Provoco ad priorem Pauli Epist. ad Corinth. cap. 5to. com. 7mo.

RESPONDENS.

Concedo minorem, et nego consequentiam.

OPPONENS.

2. Si agnus paschalis non esset sacrificium piaculare, valet consequentia;

Sed agnus paschalis non erat sacrificium piaculare;

Ergo valet consequentia.

RESPONDENS.

Nego minorem.

OPPONENS.

Provoco ad Exodi cap. 12$^{mum.}$ comm. 13$^{tio.}$ et 14$^{to.}$ unde apparet sacrificium paschale primitùs institutum fuisse in id tantùm, ut, sanguine foribus asperso, angelus vindex domos Israëlitarum agnosceret, et illæsas præteriret; et in sæculis subsecutis observatum fuisse in id tantùm, ut majorum suorum ex Ægypto liberationem Judæi commemorarent.

Si dominus respondens nunc concedat minorem, necesse est consequentiam neget: et opponens pergit ad syllogismum tertium.

3. Si igitur neque mors Christi sit sacrificium piaculare, valent consequentia et argumentum;

Sed igitur mors Christi non est sacrificium piaculare;

Ergo valent consequentia et argumentum.

RESPONDENS.

Constat tum agni paschalis mactationem, tum Christi mortem, fuisse reverà sacrificia. Hoc unum comparatio ab Apostolo instituta requirit. Esto, agni paschalis mactationem nihil piaculare habuisse; Christi tamen mors, quippe quæ sacrificium sit, hactenùs agni paschalis mactationi respondet; licet vim majorem habeat, quia sacrificium est *piaculare*.

Si verò dominus respondens non concedat minorem in syllogismo secundo, tunc moderatoris erit judicium suum interponere. Si ille existimet minorem valere, opponentem jubebit ad syllogismum tertium pergere. Contra ea, si pronuntiet minorem non valere, tunc domino opponenti nihil restat, nisi ut det manus, et ad argumentum aliud novum pergat.

In hoc argumento dubitari potest, agni Paschalis mactatio sacrificium piaculare fuerit, necne. Certè sanguis foribus aspersus vim mali avertendi habuit, ideòque effectum quendam piacularem. Sed agni mactatio, in sæculis posterioribus quotannis repe-

tita, nullam aliam vim habere videtur nisi commemorativam.*

When the respondent has replied to the first objection, the professor either signifies his approbation of the answer, or suggests another more appropriate and satisfactory. He then directs the opponent to proceed to his next argument; "Probes aliter."

Second Argument.

OPPONENS.

1. Si doctrina de redemptione humanâ hoc fundamento nitatur, scilicet, necesse fuisse ut Divinæ justitiæ pro hominum peccatis satisfieret, cadit quæstio.

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* The conditional syllogisms of which this objection consists, correspond with the three propositions of a regular categorical syllogism, and it may be viewed as *Celarent* with the premises transposed; "Christ was the paschal lamb; the paschal lamb was not a piacular sacrifice; therefore Christ was not a piacular sacrifice."

Ce- The paschal lamb was not a piacular sacrifice;
-la- Christ was the paschal lamb; therefore
-rent. Christ was not a piacular sacrifice.

In the major proposition, the middle term (the paschal lamb) is used in its primary and literal sense; in the minor proposition, in its secondary and metaphorical sense. It is not, therefore, fairly compared with the terms of the conclusion or question. This is, "Fallacia æquivocationis." After all, the truth of the major proposition admits of doubt.

Sed doctrina de redemptione humanâ hoc fundamento nititur;

Ergo cadit quæstio.

2. Si, ut hoc efficeretur, pœnæ peccatis humanis debitæ in Christum translatæ fuerint,—unum inter omnes à peccati labe purum, valet consequentia.

Sed, ut hoc efficeretur, &c.

Ergo valet consequentia.

Provoco ad Esaiæ cap. 53tium. com. 6to. et ad priorem Petri Epistolam, cap. 2do. com. 24to.

3. Si verò justitiæ proprium sit, pœnas non nisi de nocentibus exigere, valent consequentia et argumentum.

Sed justitiæ proprium est, &c.

Ergo valent consequentia et argumentum.*

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* The punishment of the innocent for the guilty, says the opponent, being repugnant to the principles of justice, could not have satisfied Divine justice for the sins of men. The innocence and vicarious punishment of Christ being supposed to be conceded, the objection, stated in form, will appear thus:

Ce- What is irreconcileable with justice, cannot satisfy Divine justice.

-la- To inflict the punishment of guilt on the innocent, is irreconcileable with justice; therefore

-rent. It could not satisfy Divine justice.

Under the moral government which God exercises here, the innocent very frequently suffer for the guilty. If, then, we allow the moral government and attributes of God, vicarious punishment and the Divine justice will no longer be

Responsum.

E Sacris Scripturis hoc unum colligendum est de redemptione humanâ; scilicet Christi mortem hunc effectum habuisse, ut homines à peccati pœnâ liberaret. Quod rationi satis consentaneum est. Videmus enim rerum naturam à Divino Opifice et Rectore ita constitutam, ut plurima nobis contingant beneficia áliorum ope, qui sæpe incommoda volentes subeunt, in id tantùm ut nos adjuvent. Nihil igitur objici potest contra doctrinam de redemptione humanâ in Sacris Scripturis traditam, quod non pari jure contra quotidianum rerum humanarum et Divinæ providentiæ ordinem adhibeatur.

Third Argument.

1. Si Divus Paulus doceat cœnam Dominicam idem esse Christianis quod epulæ sacrificales tum Judæis tum Ethnicis, cadit quæstio.

Sed Divus Paulus docet, &c.

Ergo cadit quæstio.

Provoco ad 1 Cor. x. 16—21.

2. Si igitur cœna Domini sit epulum ex oblatis, valet consequentia.

Sed cœna Domini est, &c.

Ergo valet consequentia.

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considered incompatible. The minor premiss of the categorical syllogism will be denied, in this case, to be universally true.

3. Si igitur oblatio Christi sæpiùs repetatur, valent consequentia et argumentum.

Sed oblatio Christi, &c.

Ergo valent consequentia et argumentum.*

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* This argument may be stated categorically, thus, in three syllogisms.

1.

Bar- What a sacrificial feast was to the Jews and Heathens, is what the Lord's Supper is to Christians;

-ba- A feast upon propitiatory offerings is what a sacrificial feast was to the Jews and Heathens; therefore

-ra. A feast upon propitiatory offerings is what the Lord's Supper is to Christians.

2.

Bar- A Christian propitiatory offering is the oblation of Christ;

-ba- What takes place in the Lord's Supper is a Christian propitiatory offering; therefore

-ra. What takes place in the Lord's Supper, is the oblation of Christ.

3.

Bar- What takes place in the Lord's Supper is frequently repeated;

-ba- The propitiatory oblation of Christ is what takes place in the Lord's Supper; therefore

-ra. It is frequently repeated.

The middle term of the first syllogism is here taken in different senses in the major and minor premiss. In the major premiss, it means what a sacrificial feast was, *with regard to one particular*, (viz. communion with the Deity,)

RESPONSUM.

Non docet Paulus cœnam Dominicam *prorsus* idem esse Christianis quod Judæis atque Ethnicis Epulæ sacrificales. Affirmat quandam esse similitudinem, et hâc tantùm parte, quòd insit utrique sacrificantium communicatio cum numine. Nec comparatio arctiùs premenda est. Apostolus non affirmat Christianos, in Eucharistiâ celebrandâ, et Ethnicos, in Epulis sacrificalibus, in hoc similiter agere, quòd oblatis vescantur; sed quòd et Christiani vero cum Deo, et Ethnici cum idolis suis, religiosam communicationem instituant.

Fourth Argument.

This and the following argument are against the second question, according to the rules for keeping a first opponency.

Contra Secundam.

1. Si fides justificationem antecedat, cadit quæstio.
Sed fides justificationem antecedit;
Ergo cadit quæstio.

2. Si opera qualiacunque ante justificationem peracta rationem peccati habeant, valet consequentia.

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and thus, in *that* particular, it agrees with the major term; in the minor premiss, it is taken simply, and thus, in *another* particular, (viz. its propitiatory character,) it agrees with the minor term. It is not, therefore, fairly compared with the terms of the conclusion. This may be referred to "Fallacia à dicto secundum quid, ad dictum simpliciter."

Sed opera qualiacunque, &c.
Ergo valet consequentia.

3. Si igitur fides quâ justificationem consequimur, existere possit à bonis operibus disjuncta, valent consequentia et argumentum.
Sed fides quâ, &c.
Ergo valent consequentia et argumentum.*

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* The opponent contends, that as justifying faith precedes justification, and all works before justification are sinful, therefore justifying faith may exist apart from good works. The formal statement of this argument requires four categorical syllogisms.

1.

Ce- Works that have in them the nature of sin are not good works;
-la- All works done before justification have in them the nature of sin; therefore
-rent. No works done before justification are good works.

2.

Bar- Whatever is preceded by justification is preceded by what precedes justification;
-ba- Good works are preceded by justification; therefore
-ra. They are preceded by what precedes justification.

3.

Bar- What precedes justification precedes good works. *(Equipollent to the conclusion of the last.)*
-ba- Faith precedes justification; therefore
-ra. It precedes good works.

Responsum.

Cogitatione solâ distingui possunt fides et opera bona. Fides fons est, opera bona sunt fluenta; fides causa, opera bona effectus. Simul ac fides existat, justificatio incipit, nullâque morâ interpositâ, subsequuntur opera bona. Ut sol igitur ante radios solares, ita fides ante opera bona; sed fide existente, opera bona proveniant necesse est. Neque magis disjungi possunt à fide, quàm lux à sole.

Fifth Argument.

1. Si operanti merces tribuatur non ex gratiâ sed ex debito, cadit quæstio.

Sed operanti merces, &c.

Ergo cadit quæstio.

Provoco ad Rom. iv. 4.

4.

Bar- Whatever precedes good works is distinct from them;

-ba- Justifying faith precedes good works; therefore

-ra. It is distinct from them.

Faith may be separated from good works only in thought. Faith is the fountain-head; good works, the streams that flow from it. Faith is the cause; good works, the effect. As soon as there is faith, justification begins, and good works immediately follow. As, therefore, the sun must have existed before the sunbeams, so faith must be previous to good works. But if there be faith, good works are of necessity produced; nor can they any more be separated from faith, than light can be parted from the sun.

2. Si verò justificatio, quam per fidem consequimur, sit ex gratiâ, valet consequentia.

Sed justificatio, &c.

Ergo valet consequentia.

Provoco ad Rom. iv. 5.

3. Si igitur opera bona, cum eâ, quâ justificamur, fide nihil commune habeant, valent consequentia et argumentum.

Sed opera bona, &c.

Ergo valent consequentia et argumentum.*

---

* The reward of him who works, says the opponent, is shewn in Scripture to be not of grace, but of debt. But *our* reward, viz. Justification by faith, is proved by Scripture to be of grace; therefore it cannot be the reward of him who works, nor is justifying faith connected with good works. This argument, in order to be formally stated, requires, like the last, four categorical syllogisms.

1.

Ce- That which is of debt is not of grace;
-la- The reward of him who works is of debt; therefore
-rent. It is not of grace.

2.

Ce- What is of grace, is not the reward of him who works.

(Converse of the conclusion of the last syllogism, E.)

-la- Justification by faith is of grace; therefore
-rent. It is not the reward of him who works.

RESPONSUM.

Fatendum est, justificationem nostram Divinâ ex gratiâ solummodò concessam esse; non autem sequi-

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3.

Ce- What is not the reward of him who works, has no connexion with good works;

Predicate.

-la- Justification by faith is | not-the-reward-of-him-who-works; | therefore

-rent. It has no connexion with good works.

4.

Ce- The instrumental cause of justification has no more connexion with good works, than justification itself has;

la- Justifying faith is the instrumental cause of justification; therefore

-rent. It has no more connexion with good works than justification itself has.

The major proposition of the third syllogism is unduly assumed. That which is not the reward of works may yet have connexion with them *in other respects*. Though justification is a favour, not a reward of works, yet works may be required as a *condition* of justification; and in this respect they may be inseparably connected. This circumstance does not diminish our debt of gratitude to God, to whose grace, as the efficient cause, all spiritual blessings are ascribable.

They who object to call good works, "Conditions of salvation," may term them, the necessary fruits of the faith whereby we obtain salvation; although salvation itself must be accounted a gratuitous benefit of God.

tur, licet bona opera pro causâ justificationis non habenda sint, nihil esse inter fidem et bona opera commune. Fieri enim potest, quod Sacræ Scripturæ reverà doceat, ut opera bona sint *conditiones* salutis, quam tamen Divinæ gratiæ, quasi causæ efficienti, acceptam referre debemus.

Si nolis opera bona *conditiones* salutis appellari, tunc ea licet appelles, fructus necessarios fidei illius quâ salutem consequimur; cùm tamen salus ipsa sit Dei beneficium gratuitum.

The opponent, when his last argument has been answered by the respondent, descends from the rostrum upon the moderator thus dismissing him; "Satis disputâsti."

ACTS IN THE CIVIL LAW.

Before keeping an Act in the Civil Law, the student submits, to the Regius Professor in that faculty, a few questions, that he may fix on one of them as a fit subject for a Latin thesis.*

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* A candidate for the degree of LL.B. must submit to the Professor the question he means to write upon, at least one term before the act is kept. A candidate for the degree of LL.D. must do the same at least two terms previously to his act.

A second question is also chosen by the professor exclusively, who reads a Determination on it, when the disputation is finished.

On the day of the exercise, the respondent having occupied his rostrum, and the professor being seated, the Father of the respondent's college directs him to begin: "Domine respondens, agas."

The following is a copy of the printed questions proposed by the Professor in his examination paper of the present year. Other questions in MS. are also given to each student, according to the nature of the subjects proposed for discussion in the Schools.

1. Explain the nature and utility of syllogisms in general.
2. Explain the nature of the syllogisms used in the law schools.
3. State an instance of a Dilemma in favour of your first question from
4. Prove your first question to be true by Induction from
5. Form an argument in two hypothetical syllogisms, in favour of your first question, from
6. Form, in Latin, an argument in three hypothetical syllogisms, against your first question, from
7. Form, in Latin, an argument against your second question, in three hypothetical syllogisms, from

Let the minor of the second syllogism be false.

8. Make a short statement, in *English*, of your first question.
9. Make a short statement, in *Latin*, of your second question.

The respondent then proposes the questions, placing that first on which his thesis is written.

Except when an opponency is kept for a Doctor's degree, the Regius Professor is himself both opponent and moderator. He produces as many arguments against each question as he thinks proper, in the form of syllogism already explained.

It is the office of the respondent (as in the Divinity School) to defend each question by an appropriate answer to the objections adduced by the opponent.

If the answer of the respondent be satisfactory to the professor, he signifies his approbation, and proceeds, in the capacity of opponent, to propose his next argument. But if the answer of the respondent be erroneous or inconclusive, the professor (departing for the time from the character of opponent) points out to the respondent the true solution of the difficulty: and this he does, not only for the advantage of the respondent but, for the instruction of the auditors frequenting the law-school, the majority of whom attend there expressly with a view to prepare themselves for responding in a disputation.

In the course of the act, the professor, at his discretion, tries the ability of the respondent, by interrogatories on such subjects as are connected with the question.

The following is a specimen of the nature of the questions discussed, and of the manner of arguing against them. The student may easily collect, from the references,* the nature and force of the argu-

Quæstiones sunt:

1. *Decemviri creditoribus in debitores jus vitæ atque necis non dederunt.*

2. *Romani primos Christianos non ideò persecuti sunt, quia cœtus nocturnos celebrabant.*

Contra priorem.

1. Si in lege Decemvirali de debitore, pœna capitis non nisi de ultimo supplicio est accipienda, cadit quæstio.

Sed in lege Decemvirali, &c.

Ergo cadit quæstio.

2. Si dominis in servos jus erat vitæ atque necis, valet minor.

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* A copy of the *Corpus Juris Civilis*, is placed on the rostrum of the respondent, and another on that of the opponent.

Sed dominis in servos, &c.
Ergo valet minor.

3. Si æris convicti jure Decemvirali in servitutem redigebantur, valent consequentia et argumentum.
Sed æris convicti, &c.
Ergo valent consequentia et argumentum.

The opponent then refers the respondent to the following authorities in confirmation of his argument, and it is the duty of the respondent to make his answer.

Ins. 1. 8. 1.
D. 1. 5. 5.
Matt. 18. 25.
Liv. Hist. 6. 14.

Contra alteram.

1. Si causa persecutionum quibus primi Christiani vexabantur, aut ab ipsâ Christi religione aut ex quâdam ratione civili petenda est, cadit quæstio.
Sed causa persecutionum, &c.
Ergo cadit quæstio.

2. Si Romani omnibus ferè gentibus suam religionem et suos ritus celebrare permitterent, valet consequentia.
Sed Romani, &c.
Ergo valet consequentia.

3. Si igitur necesse est ut quædam ratio civilis eos excitaret ad Christianos vexandos, valet consequentia.
Sed necesse est ut, &c.
Ergo valet consequentia.

4. Si ista ratio fuit metus ne quid detrimenti caperet respublica, valent consequentia et argumentum.

Sed ista ratio fuit, &c.
Ergo valent consequentia et argumentum.

Tac. Annal. 1, 73.
xii. Tab.
Leg. Gab.
SCT Marc.
D. 47, 22, 1.
D. 47, 11, 2.

In the progress of this argument, the opponent might, if occasion required, refer to the sacred Scripture, as well as to the authorities above mentioned.

The respondent's answer will be suggested partly from his own interpretation of these authorities cited by the opponent, and partly from his own view of the question in general.

ACTS IN MEDICINE.

A medical thesis may be composed on any practical, physiological, or pathological question. It must be of such a length as not to consume more than half-an-hour in the delivery.

For the degree of M. B. the question must be submitted to the professor, for his approval, six weeks before the act is kept; and, for the degree of M. D., three months before.

The respondent has to defend two questions, of which one is appointed exclusively by the professor; as in the case of a Divinity Act.

The professor does not restrict the opponent from extending the number of his arguments, if he pleases; but he must not produce fewer than five in all; *i. e.* three against the first question, and two against the second. Each of these arguments may consist of two, three, or four syllogisms.

There is but one opponent; and if the act be kept for a Doctor's degree, the opponent is most frequently the professor himself.

The forms of keeping an act in Medicine, correspond with those observed in keeping an act in the civil law.

In a medical disputation, it does not always happen that the respondent maintains the position which the moderator holds to be true. The truth may appear on the opponent's side, and the decision be accordingly given in his favour. The following, however, are specimens in which the position maintained is true, and the objections fallacious.

Quæstiones sunt:

1. *Venæsectio primum et præcipuum remedium est Enteritidis.*

2. *Bilis è sanguine venoso secernitur.*

OPPONENS.

Contra priorem.

1. Si intestinorum inflammatio ab alvo diu astrictâ et suppressâ sæpe oriatur, cadit quæstio.

Sed intestinorum &c. sæpe oritur;

Ergo cadit quæstio.

RESPONDENS.

Concedo intestinorum inflammationem cum alvo diu astrictâ sæpiùs conjunctam esse, et aliquando ex hac origine exortam.

OPPONENS.

2. Si alvum solvere et purgare primum et præcipuum sit hujus mali remedium, valet consequentia.

Sed alvum solvere, &c.

Ergo valet consequentia.

RESPONDENS.

Concedo quoque maximi esse momenti ut alvus astricta solvatur.

OPPONENS.

3. Si igitur intestinorum inflammatio ab alvo astrictâ orta, optimè curetur medicamentis purgantibus, valent consequentia et argumentum.

Sed intestinorum inflammatio, &c.

Ergo valent consequentia et argumentum.

RESPONDENS.

In hoc morbo res maximi momenti est ut depellatur inflammatio, id quod optimè per venæsectionem efficitur. Animadvertendum quoque medicamenta purgantia sæpe vim suam non exerere, nisi post detractionem sanguinis.

OPPONENS.

Contra alteram.

1. Si in omni aliâ glandulâ corporis, præterquam hepate, secretio humoris fiat è sanguine arterioso, cadit quæstio.

Sed in omni &c.

Ergo cadit quæstio.

RESPONDENS.

Concedo minorem et nego consequentiam.

OPPONENS.

2. Si in rebus obscuris investigandis confidere necesse sit comparationi similitudinis vel analogiæ, valet consequentia.

Sed in rebus obscuris &c.

Ergo valet consequentia.

RESPONDENS.

Concedo minorem &c.

OPPONENS.

3. Si igitur ab hac comparatione concludendum sit, ut bilis è sanguine arterioso secernatur, valent consequentia et argumentum.

Sed ab hac comparatione &c.

Ergo valent consequentia et argumentum.

RESPONDENS.

Argumento domini opponentis refragatur quidem analogia, quum jecori, quod bilem secernit, sanguis venosus suppeditetur, (ex Venâ Portarum scilicet,) simili modo quo cæteris glandulis sanguis arteriosus, ex arteriis suis.

ACTS IN THE SCHOOL OF ARTS.

The Preliminaries of these Acts are, of necessity, well known to all who are concerned in keeping them. No one can oppose or respond in the School of Arts, till he has resided seven Terms in the University. A particular introduction to the following questions would, therefore, be superfluous.

Quæstiones sunt:

1. *Rectè statuit Newtonus in nonâ suâ sectione libri primi.*

2. *Rectè sese habent Principia Calculi tum Differentialis tum Integralis.*

3. *Rectè statuit Paleius de Virtute.*

Contra primam.

1. Si cùm spiralis reciproca in antecedentia revolvatur eâdem velocitate angulari quâ corpus in consequentia movetur, orbita in fixo spatio descripta fiat

linea recta in quâ corpus motu uniformi ad centrum accedit, cadit quæstio.

Sed cùm &c. **** fit &c. *** accedit;

Ergo cadit quæstio.

2. Si cùm vis in spirali reciprocâ varietur $\frac{1}{D3}$, et virium differentia in orbitâ quiescente et in orbitâ in fixo spatio descriptâ varietur similiter $\frac{1}{D3}$, consequens sit totam vim in orbitâ in fixo spatio descriptâ variari $\frac{1}{D3}$, valet consequentia.

Sed cùm vis, &c. **** consequens est &c.

Ergo valet consequentia.

3. Si verò cùm vis varietur $\frac{1}{D3}$, corpus nequeat in rectâ lineâ ad centrum descendere motu uniformi, valent consequentia et argumentum.

Sed cùm &c. **** nequit &c.

Ergo valent consequentia et argumentum.

RESPONSUM.

Differentia virium centripetarum et centrifugarum in orbitâ in fixo spatio descriptâ, eadem est ac in orbitâ quiescente. Sed in spirali reciprocâ vires centripeta et centrifuga æquales sunt. Ergo in rectâ lineâ quæ in fixo spatio describitur æquales sunt; ideòque corpus nullâ vi impulsum velocitate primâ ad centrum uniformiter accedit.

The first opponent produces two other similar arguments against the first question.

Contra secundam.

1. Si inter limites $x=a$, $x=b$ $\int \frac{dx}{x}$ fiat $h.l.\frac{a}{b}$, cadit quæstio.

Sed inter limites &c.

Ergo cadit quæstio.

2. Si inter eosdem limites $\int x^{n-1}\,dx$ fiat $\frac{a^n-b^n}{n}$ valet consequentia.

Sed inter &c.

Ergo valet consequentia.

3. Si igitur cùm $n=o$, $\int\frac{dx}{x}$ fiat $\frac{a^o-b^o}{o}$, seu $\frac{1-1}{o}$, seu o, valent consequentia et argumentum.

Sed cùm &c.

Ergo valent consequentia et argumentum.

RESPONSUM.

$$a^n=1+h.\,l.\,a.\,n+\frac{\overline{h.\,l.\,a.}\rceil^2}{1\,.\,2}\,n^2+\&c.$$

$$b^n=1+h.\,l.\,b.\,n+\frac{\overline{h.\,l.\,b.}\rceil^2}{1\,.\,2}\,n^2+\&c.$$

$$\therefore a^n-b^n=\left\{h.\,l.\,a-h.\,l.\,b\right\}.\,n+\&c.$$

$$\therefore\frac{a^n-b^n}{h}=\left\{h.l.a-h.l.b\right\}+\frac{\overline{h.\,l.\,a}\rceil^2-\overline{h.\,l.\,b}\rceil^2}{1\,.\,2}n+\&c.$$

$$\therefore\frac{a^o-b^o}{o}=h.\,l.\,a-h.\,l.\,b.$$

$$=h.\,l.\frac{a}{b}$$

Ergo valor fractionis $\frac{a^n-b^n}{n}$ cum $n=o$ non evanescit, sed fit $h.\,l.\,\frac{a}{b}$ ideòque nulla discrepantia existit.

The first opponent produces one other similar argument against this question.

Contra tertiam.

1. Si Dei voluntas sit virtutis regula, cadit quæstio.
Sed Dei voluntas est, &c.
Ergo cadit quæstio.

2. Si Dei voluntas ideò nos astringat quia præmia pœnæque vitæ futuræ ex Dei arbitrio pendent, valet consequentia.
Sed Dei voluntas &c.
Ergo valet consequentia.

3. Si igitur, posito quòd angelorum malorum princeps summo rerum imperio potitus esset, voluntas ejus nos pari jure astringeret, valent consequentia et argumentum.
Sed, posito quòd &c.
Ergo valent consequentia et argumentum.

RESPONSUM.

Ut alia taceam, Deus homines felices vult; angelorum malorum princeps, miseros; huic ut resistamus, illi ut obediamus, ratio et natura suadent. Priusquam angelorum malorum princeps hominum felicitatem velle possit, naturam suam se exuat necesse est.

Against the third question one argument only is produced.

FINIS.

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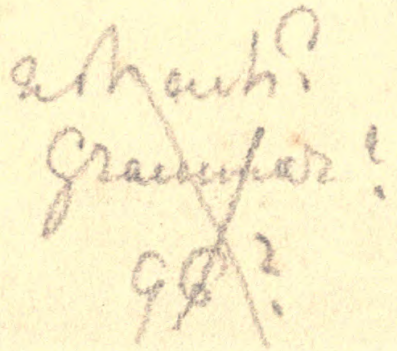
A GUIDE TO SYLLOGISM,

OR,

A MANUAL OF LOGIC.



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A

FIRST LOGIC BOOK.

BY

D. P. CHASE, M.A.

FELLOW OF ORIEL COLLEGE, PRINCIPAL OF ST. MARY HALL.

"*Mehercle*, if their sons be ingenious they shall want no instruction; if their daughters be capable, I will put it to them."—*Love's Labor's Lost*, Act iv. Sc. ii.

OXFORD:

JAMES PARKER AND CO.

1875.

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PREFACE.

—

THE attempt is made, in the following pages, to render the bare rudiments of Deductive Logic intelligible to every person, of average intelligence, of either sex; in the hope that those rudiments may be adopted, for both sexes, as a regular part of mental training.

(1) Arithmetic,

(2) The First Book of Euclid,

(3) The Rudiments of Deductive Logic,

supposing that each is *intelligently taught and mastered*, form an excellent course of mental training: one, moreover, which may easily be given at Schools.

220699

PART I.

CHAPTER I.

OF THE ART OF LOGIC, so far as it will be treated of in the following pages, the purpose is TO LAY DOWN RULES WHEREBY TO DETERMINE—

1. *Any Proposition being assumed*[a] *to be true, what other Propositions must be maintained with it.*

2. *Any two or more Propositions being assumed*[a] *to be true, whether any, and, if any, what, other Propositions result from them.*

The former is the more generally applied. Rarely, if ever, in practice do we start from assumed Propositions in order to arrive at the resulting Proposition.

We take up Propositions from many different causes: when any one of these is challenged, we seek to discover those other Propositions by which it must be maintained.

For instance—our forefathers maintained (that) "Duelling is to be permitted."

Asked "Why?" they would have replied, (because) "It is socially expedient." Further pressed by "How so?" they would have said,

[a] Logic is concerned only with relative, not with absolute, truth, although incidentally it assists in arriving at the latter.

"It keeps up a sense of honour."
"It prevents bullying."
"It does much to equalise the weak and the strong."

Pressed again by "Well—what then?" they would have advanced the general assertions—

"Whatever keeps up a sense of honour,
..... prevents bullying,
..... does much to equalise the weak and the strong,
} is socially expedient."

What then is a Logical Proposition?

A sentence which asserts that a certain attribute (*or aggregate of attributes*) *does, or does not, exist in a certain Subject.*

Its parts are, necessarily, four:

Subject—whereof something is asserted.

Predicate—asserted of the Subject.

Copula—shewing whether such assertion is affirmative or negative.

Sign of quantity—shewing of how much of the Subject the Predicate is asserted.

The Copula ordinarily employed is the present Indicative of the Verb "to be"; and, for reasons to be hereafter noticed, no other tense.

But, inasmuch as the office of the Copula is simply to indicate relation between Subject and Predicate as ideas, and the verb "to be" implies, unavoidably, their existence as things,

We propose to employ Algebraic signs, i. e., for affirmative assertions + , for negative assertions — .

Examples of Logical Proposition in strict Form.

	Sign of Quantity.	Subject.	Copula.	Predicate.
(*a*)	Some	men	+	dishonest.
(*b*)	Some	war	—	righteous.
(*c*)	All	deceit	+	hateful.
(*d*)	All	birds	—	quadrupeds.

The word Predicate is unavoidably ambiguous.

It means—

1. *The thing or attribute predicated;* as, above, Dishonesty, Righteousness, &c.

2. *The Term predicated;* Dishonest, Righteous, &c.

Since "dishonest" means "having dishonesty,"
"righteous" .. "having righteousness,"
the assertion is the same when we say,
for (*a*) Dishonesty exists in some men,
for (*b*) Righteousness does not exist in some wars.

But our own language (as do many others) expressly avoids this form and employs the other.

By Predicate therefore, until further notice, we shall understand *a Term expressive of a class*

(1) in which the Subject is asserted to be, wholly or partially, included;

(2) from which the Subject is asserted to be, wholly or partially, excluded.

We have thus FOUR distinct classes of Logical Proposition,

1. AFFIRMATIVE, in which the Predicate includes the whole Subject.
2. ..... in which the Predicate includes only part of the Subject.
3. NEGATIVE, in which the Predicate excludes the whole Subject.
4. ..... in which the Predicate excludes only part of the Subject.

NOTE THAT

1 and 3 are called *Universal* { Affirmative, Negative.

2 and 4 .... *Particular* { Affirmative, Negative.

The SIGNS OF QUANTITY are

for Universal Propositions, ALL,
for Particular Propositions, SOME.

But NOTE THAT the usage of our own language necessitates a modification of the SIGN "ALL" in the case of a Negative Proposition.

Thus: of the Proposition "*All men — infallible,*" the true meaning is "*All men are excluded from the class 'Infallible.'*"

But, if it is translated into ordinary English and written, "*All men are not infallible,*" it would be taken as implying "*Some men are, and some are not, infallible.*"

For this reason only the SIGN OF QUANTITY in an Universal Negative Proposition is No or NONE: i. e. instead of

"The whole of the Subject is excluded from" } the Predicate.
"No part of the Subject is included in"

The SYMBOLS commonly used are,

for the Universal Affirmative, A.
..... Negative, E.
.. Particular Affirmative, I.
..... Negative, O.

and these Symbols are, as a matter of convenience, generally substituted for the longer form.

Examples.

SYMBOL.	SIGN OF QUANTITY.	SUBJECT.	COPULA.	PREDICATE.
A	All	men	+	mortal.
E	No	men	–	infallible.
I	Some	men	+	dishonest.
O	Some	men	–	dishonest.

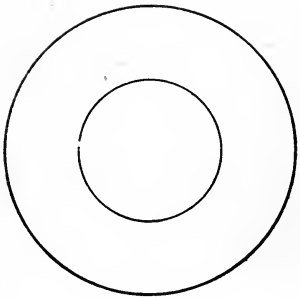
The relation of SUBJECT and PREDICATE in each may be illustrated thus:—

In A, by two concentric circles, the smaller representing the SUBJECT, the larger the PREDICATE.

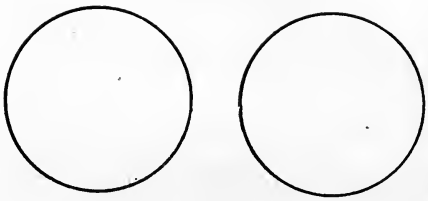
In E, by two circles, of any relative size, whose circumferences do not intersect each other.

In I and O, by two circles, of any relative size, whose circumferences do intersect each other.

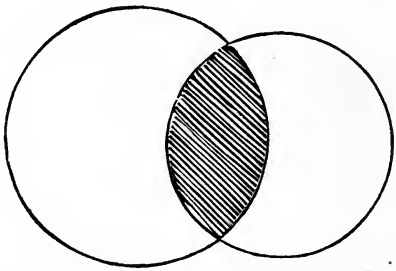
A



E



I or O



NOTE, I. that, since several grammatical words may be required to convey a single idea, SUBJECT *and* PREDICATE *may each consist of several such words, but will still be each* ONE TERM. Just as the same value may be represented by one gold coin, 20, 40, 60, or 80 silver ones, &c. &c.

Example.

"The annual labour of every nation	+	the fund which originally supplies it with all the necessaries and conveniences of life which it annually consumes."

Languages differ much in the power of concisely representing ideas.

Thus a Logical Proposition of which in Greek the SUBJECT and PREDICATE are each one word cannot be adequately expressed in English by words fewer than the following :—

SUBJECT.	COPULA.	PREDICATE.
"No man in whom Reason, after a struggle, holds in check the bodily Appetites	—	arrived at that state in which the bodily Appetites have been trained never to rebel against Reason."

II. *The Logical* SUBJECT *or* PREDICATE *is the same whatever may be the grammatical disguise.*

For instance,

"*Nothing is sweeter than honey*" = Honey + than which nothing is sweeter.

"*Fools make a mock at sin*" = All who make a mock at sin + Fools.

This may be more fully illustrated in translating from other languages. But in order to read our own correctly it is often essential to determine what is the Logical Subject or Predicate. Shall we lay the emphasis (above) on *Fools* or on *Sin?*

This is best exemplified *vivâ voce:* but Whately's example is excellent;

"The Organon of Bacon was not designed to supersede the Organon of Aristotle."

This proposition admits of as many interpretations as there are verbs and substantives in it: they are capable of being expressed by emphasizing each in turn.

CHAPTER II.

DISTRIBUTION OF TERMS.

A Term is said to be *distributed* when it denotes all that it is capable of denoting; *undistributed* when it denotes less.

All Terms are

either *Singular*—capable only of denoting an Individual;

or *Common*—capable of denoting many individuals and each of them.

A SINGULAR TERM is always distributed, because it cannot denote less than all the Individual. No Proposition being in strict Logical Form unless the sign of Quantity is prefixed, the distribution or non-distribution of THE SUBJECT is obvious at once: hence

Rule I. *All Universal Propositions distribute the* SUBJECT.
No Particular Propositions distribute the SUBJECT.

An Affirmative Proposition is "that in which the Subject is asserted to be, wholly or partially, included in the Predicate;" how much beside that Subject the Predicate is capable of including is immaterial: hence

Rule II. *No Affirmative Propositions necessarily distribute the Predicate:* it is therefore *assumed* that no such Propositions do distribute it.

Again, a Negative Proposition is "that in which the Subject is asserted to be, wholly or partially, excluded from the Predicate."

Now that from which any thing is excluded must be spoken of in its entireness.

(No amount of wire fencing will keep rabbits out of a flower garden, if a gap of six inches be left:) hence

Rule III. *All Negative Propositions necessarily distribute* THE PREDICATE.

Summary.

In E, *both* SUBJECT AND PREDICATE are distributed.
I, *neither* SUBJECT NOR PREDICATE are distributed.
A, THE SUBJECT *only* is distributed.
O, THE PREDICATE *only* is distributed.

OR,

E distributes both Terms,
I distributes neither,
A distributes the Subject *only*,
O distributes the Predicate *only*.

Simple as all this is, it should be thoroughly taken in by the memory before the learner goes any further.

This done, we may proceed to consider

CHAPTER III.

CONVERSION OF PROPOSITIONS.

A Proposition is CONVERTED,

When the Terms are transposed, the Copula remaining unchanged.

The only RULE is,

No Term may be distributed in the CONVERSE (*i.e.* Proposition, when converted) *which was not distributed in the original Proposition.* Hence

I. Since it is assumed that in no affirmative Proposition is the Predicate distributed, *the limiting* (*or Particular*) *sign* SOME *must be prefixed to the Subject of the Converse of every affirmative Proposition.*

II. Since in every Universal Negative Proposition both Terms are distributed,

No change of sign of Quantity is necessary in the Converse of any Universal Negative Proposition.

Examples.

A	All Squares	+	Rectangles.
I	Some Rectangles	+	Squares.
I	Some Parallelograms	+	Squares.
I	Some Squares	+	Parallelograms.
E	No Squares	−	Pentagons.
E	No Pentagons	−	Squares.

But, since the truth of every Universal Proposition implies the truth of the Particular Proposition having the same Subject, Copula, and Predicate, we may also say,

O Some Pentagons — Squares.

Summary.

A	after Conversion becomes	I.
I	after Conversion becomes	I.
E	after Conversion becomes	E.
E	after Conversion *may become*	O.

NOTE. Because I and E after Conversion remain unaltered as to sign of Quantity their Conversion has been usually distinguished by the name SIMPLE.

This, I think, is a mistake.

There is but one Rule and Method of Conversion, although the application of it produces a change in the form of A, none in that of I or of E.

But why is nothing said of O?

Because it cannot be converted. Its SUBJECT, not being distributed, would, by transposition, become distributed as PREDICATE of a Negative Proposition; and thus the only Rule of Conversion is at once broken by the act of transposition.

Example.

O Some Triangles — Equilateral.
Equilateral — Triangles.

The Term *Triangles*, undistributed as the SUBJECT of O, a particular Proposition, becomes distributed as PREDICATE of a Negative Proposition.

But although O is incapable of Conversion it is easily changed into an equivalent I, and that I is convertible.

Whatever x may stand for, all things are divisible into x and not-x. Therefore to assert that any SUBJECT is included in not-x is equivalent to asserting that it is excluded from x.

Example.

O Some Triangles — Equilateral
is equivalent to
I Some Triangles + not-Equilateral
whose Converse is
I Some not-Equilateral + Triangles.

The only difficulty in Conversion lies in bringing Propositions from their ordinary, colloquial or written, form into the strict Logical form; that is, really, in getting at their meaning. When a Proposition has been brought into the strict Logical form, the more mechanically the process of Conversion is performed the better; for the less is the chance of error.

But the difficulty is a real one; and in the overcoming it consists almost the only educational value of the process.

(A few examples are given; but any intelligent learner may easily multiply them to any extent. In each, the Proposition in its ordinary form is bracketed with the strict Logical, and the Converse subjoined.)

Better late than never.
A To do late + better than to do never.
I Some better than to do never + to do late.

	Only the good are happy.		
E	No not-good	—	happy.
E	No happy	—	not-good.

	Not every tale is to be believed.		
O	Some tales	—	to-be believed.
I	Some tales	+	not-to-be believed.
I	Some not-to-be believed	+	tales.

	All is not gold that glitters.		
O	Some glittering	—	gold.
I	Some glittering	+	not-gold.
I	Some not-gold	+	glittering.

	The story may be true.		
	That the story is true	+	possible.
	Some possible	+	that the story is true.

(The next two examples illustrate an *use* of Conversion.)

	Fools make a mock at sin.		
A	Fools	+	making a mock at sin.
I	Some making a mock at sin	+	Fools. (Vapid.)

	Fools make a mock at sin.		
E	No not-Fools	—	make a mock at sin.
E	None making a mock at sin	—	not-Fools.

i.e., "All who make a mock at sin are Fools;" *or*, "to make a mock at sin is a *proof* of folly."

	Self-love is not inconsistent with Benevolence.		
A	Self-love	+	not-inconsistent with Benevolence.
I	Some not-inconsistent with Benevolence	+	Self-love.

But the same may be asserted (ordinarily) of eating one's dinner.

	Self-love is not inconsistent with Benevolence.		
E	Self-love	—	inconsistent with Benevolence.
E	No inconsistent with Benevolence	—	Self-love.

Thus treated, the original Proposition is seen to contain an important Principle of Morals.

We have next to consider

CHAPTER IV.

OPPOSITION OF PROPOSITIONS.

To be OPPOSED, Propositions must

I. have exactly the same SUBJECT and PREDICATE;

II. differ

(*a*) in Sign of Quantity *only*,

(*b*) in Copula *only*,

(*c*) *both* in Sign of Quantity and in Copula.

In (*a*) the Opposition is called SUBALTERN.
In (*b*) CONTRARY.
In (*c*) CONTRADICTORY.

(It will, however, be seen afterwards that (*b*) is divided into CONTRARY and SUB-CONTRARY.)

It has been disputed, somewhat uselessly, whether the doctrine of Opposition involves Inference.

I think it sufficient to say that it teaches

"*Any one Proposition being assumed to be true or false, what may be known respecting others containing exactly the same* SUBJECT *and* PREDICATE."

The best way of arriving at its Laws is by experiment.

We must take account of what is termed the

MATTER OF PROPOSITIONS; *i.e.*, the relation which in the

nature of things exists, or which is supposed to exist, between any two Terms before they are placed in any Proposition.

This relation may be such, that

I. One term is invariably included in the other.

II. One term is invariably excluded from the other.

III. One term is sometimes included in, and sometimes excluded from, the other.

Two Terms standing in

Relation I. are said to be in NECESSARY
II. in IMPOSSIBLE } Matter.
III. in CONTINGENT

(NOTE ESPECIALLY that all the Propositions which can be formed with exactly the same SUBJECT and PREDICATE are in the same Matter. Thus, assuming that Man and Infallible are in IMPOSSIBLE Matter,

All men + Infallible (false),
No men − Infallible (true),
Some men + Infallible (false),
Some men − Infallible (true),

are all Propositions in IMPOSSIBLE Matter.)

On very slight consideration we find that

In NECESSARY Matter, A and I are true,
E and O are false.

In IMPOSSIBLE Matter, A and I are false,
E and O are true.

In CONTINGENT Matter, A and E are false,
I and O are true.

These facts are usually represented in the manner following, (N. I. C. denoting the kinds of Matter.)

N true I false C false	A	CONTRARIES.	E	N false. I true. C false.

SUBALTERNS. CONTRADICTORIES. CONTRADICTORIES. SUBALTERNS.

N true I false C true	I	SUB-CONTRARIES.	O	N false. I true. C true.

Reading horizontally at the top, we find that A and E are never both true, but may be both false.

Reading horizontally at the bottom, that I and O are never both false, but may be both true.

Reading diagonally, that { A and O / E and I } are never both true, and never both false.

Reading vertically downwards, that

where A is true, I is true;

where E is true, O is true.

Reading vertically upwards, that

where I is false, A is false;

where O is false, E is false.

Summary.

CONTRARIES cannot be both true, may be both false.

SUB-CONTRARIES cannot be both false, may be both true.

CONTRADICTORIES cannot be both false, cannot be both true.

In SUBALTERNS, the truth of the Universal implies that of the Particular;
the falseness of the Particular implies that of the Universal.

It is, perhaps, worth while to note that a Proposition having for its SUBJECT a Singular Term can only be opposed to its CONTRARY, since the Quantity of the Proposition cannot be altered.

Extracts from the remarks of Mr. Mill, on the Processes of Opposition and Conversion.—("System of Logic," 4th edition, pp. 184, 185.)

"In a manual for young students it would be proper to dwell at greater length on the CONVERSION and ÆQUIPOLLENCY of Propositions.

For, although that cannot be called Reasoning or Inference which is a mere reassertion, in different words, of what had been asserted before, there is no more important intellectual habit, nor any the cultivation of which falls more strictly within the province of the Art of Logic, than that of discerning rapidly and surely the identity of an assertion, when disguised under diversity of language. . . . . And the student of Logic, in the discussion even of such truths as we have cited above, acquires habits of circumspect interpretation of words, and of exactly measuring the length and breadth of his assertions, which are among the most indispensable conditions of any considerable mental attainment, and which it is one of the primary objects of Logical discipline to cultivate."

PART II.

CHAPTER I.

OF SYLLOGISM.

SYLLOGISM is *that kind of reasoning in which two, or more, Propositions being assumed*[a]*, some other Proposition must result from the Propositions so assumed.*

These Propositions may be

(*a*) CATEGORICAL, which assert absolutely; (for example, "A B + deserving of death.")

(*b*) HYPOTHETICAL, which assert the dependence of one Categorical Proposition upon another; for example, "If A B + traitor A B + deserving of death;"

or, "The assertion + either mistaken or malicious"

$$= \begin{cases} \text{If the assertion} - \text{mistaken it} + \text{malicious.} \\ \qquad\qquad\quad - \text{malicious it} + \text{mistaken.} \\ \qquad\qquad\quad + \text{mistaken it} - \text{malicious.} \\ \qquad\qquad\quad + \text{malicious it} - \text{mistaken.} \end{cases}$$

[a] See page 3.

We shall treat first of that kind of SYLLOGISM in which Categorical Propositions are assumed, and which is therefore named CATEGORIGAL SYLLOGISM.

Every SYLLOGISM consists of TWO PARTS:

I. *The Propositions assumed* = the ANTECEDENT.
II. *The Proposition necessarily resulting* = the CONSEQUENT.

The former is commonly called, "The PREMISES;" (more properly the Premisses, *i.e.* Propositiones Præmissæ.)

The latter is commonly called, "The CONCLUSION."

When, however, a Proposition is assumed, and the purpose is to find what other Propositions must be maintained with it[b], such Proposition is named "The QUESTION."

OF SIMPLE CATEGORICAL SYLLOGISM.

The simplest form of SYLLOGISM, from which the Rules of all may be gathered, is *that which consists*

of only two assumed Propositions = PREMISSES,
and of the Proposition necessarily resulting from them = CONCLUSION.

In order to *construct* such a SYLLOGISM, we must begin (as in all construction) from the bottom; *i.e.* from the QUESTION.

Is some A included in B?
Is all A included in B?
Is some A excluded from B?
Is all A excluded from B?

[b] See page 3.

The answer to each must be affirmative or negative; and it is to the answer that the name "the QUESTION" will henceforth be given.

To prove such QUESTION it is necessary to employ SOME THIRD TERM (say C), with which each Term of the QUESTION may (as it is commonly said) "be compared," *i.e.* stand as SUBJECT or PREDICATE in a Premiss.

Rule A.—To prove an AFFIRMATIVE QUESTION,

The THIRD TERM *must be such that each Term of the* QUESTION *can stand with it in an Affirmative Premiss.*

Rule B.—To prove a NEGATIVE QUESTION,

The THIRD TERM *must be such that one Term of the* QUESTION *can stand with it in an Affirmative Premiss, while the other stands with it in a Negative Premiss.*

Examples.

(1)	All	A	+ C.	(3)	All	A	+ C.
	All	C	+ B.		No	C	− B.
	All	A	+ B.		No	A	− B.
(2)	Some	A	+ C.	(4)	Some	A	+ C.
	All	C	+ B.		No	C	− B.
	Some	A	+ B.		Some	A	− B.

NOTE THAT in Syllogism (1)

B is the greatest, *i.e.* most comprehensive, Term employed:
A smallest, least
C, including A and being included in B, is, in respect of comprehensiveness, MIDDLE.

Hence, for convenience, in *all* SIMPLE CATEGORICAL SYLLOGISMS,

The Subject of the Question (or Conclusion) is named MINOR TERM.

The Predicate of the Question (or Conclusion) is named MAJOR TERM.

The Third Term employed in each Premiss is named MIDDLE TERM.

The PREMISSES are similarly named:

That in which the Major Term occurs is named MAJOR PREMISS.

That in which the Minor Term occurs is named MINOR PREMISS.

[The Student will do well to pause and refresh his memory of the Rules of Distribution of Terms in each kind of Proposition (see page 9) before he proceeds to consider]

CHAPTER II.

THE RULES OF SIMPLE CATEGORICAL SYLLOGISM.

Of these, those hereafter numbered 1, 2, 3, 6, 7 are obviously implied in the two given above for proving QUESTIONS, whether Affirmative or Negative.

1. *Three, and not more than three, distinct Terms may be employed.*

2. *Three, and not more than three, distinct Propositions may be employed.*

3. *The third (Middle) Term must not be ambiguous in itself.*

[Nor by its position.

Neither the SUBJECT of a Particular Premiss, nor the PREDICATE of an Affirmative Premiss, is distributed. But, unless the Middle Term has been once distributed, we cannot know that in each Premiss we are intending to use the *same* Term. If, on the contrary, it has been distributed in one Premiss, however small a portion of it may be intended in the other, that portion has been used before. Hence we have]

4. *The Middle Term must always be once distributed; i.e. it must be either the* SUBJECT of an Universal *or the* PREDICATE of a Negative } Premiss.

Examples of Middle Term Undistributed.

(1) All scarlet-fever-patients + having sore throat.
A B + having sore throat.
A B + scarlet-fever-patient.

(2) Some having sore throat + scarlet-fever-patients.
A B + having sore throat.
A B + scarlet-fever-patient.

In the first example, it is clear that the MIDDLE TERM "having sore throat" may include "All scarlet-fever-patients" and "A B," and yet the two latter Terms are not necessarily connected.

In the second, that one part of "having sore throat" may include "A B," while a different part may be included in "scarlet-fever-patients."

5. *Neither Term in the* QUESTION *(or* CONCLUSION*) may be distributed, unless it is also distributed in the Premiss in which it stands.*

The violation of this Rule is called ILLICIT PROCESS *of the Major Term* when the PREDICATE, *of the Minor Term* when the SUBJECT } is wrongfully distributed.

But the PREDICATE can only be distributed in a Negative Proposition, and the SUBJECT only in an Universal Proposition: consequently,

Illicit Process of the Major Term implies that the QUESTION (or CONCLUSION) is Negative when it ought to be Affirmative.

Illicit Process of the Minor Term, that it is Universal when it ought to be Particular.

The Conclusion ought to result necessarily from the Premisses. More cannot result from less (if a man owes me £5, I may not demand £6): less may result from more (if a man owes me £5, I may accept any less sum).

Consequently, it is not necessary that either Term in the QUESTION (or CONCLUSION) shall be distributed; although it may have been distributed in the Premiss in which it stands.

6. *Two Negative Premisses are inadmissible.*

Such case not being contemplated in Rules A or B.

7. *If either Premiss is negative, the Conclusion must be negative.*

Because, by the last Rule, the other Premiss must be affirmative, and Rule B applies.

8. *Two Particular Premisses are inadmissible.*

Suppose the Premisses to be I and I: then the Middle Term cannot be distributed.

Suppose them to be O and I, (since, by Rule 6, O and O are inadmissible.)

Since in O and I only one Term is distributed (and that *must* be the Middle Term), neither Term of the Conclusion can be distributed.

But by Rule 7 the Conclusion must be negative, since there is a negative Premiss. Therefore, the Major Term will be distributed in the Conclusion, undistributed in the Major Premiss: and then Rule 5 is broken.

Briefly. Two Particular Premisses must cause,
either *Non-distribution of the Middle Term;*
or *Illicit Process of the Major Term.*

9. *A Particular Premiss necessitates a Particular Conclusion.*

Such Particular Premiss must be I or O.

With I may be associated E or A (not I or O, both being Particular).

With O may be associated only A (not I or O, both being Particular; not E, being Negative).

The cases then will be,

1. { I distributing no Term / A only one. } — *Since the Middle Term must be distributed,* here no distribution is possible in the Conclusion, which must therefore, ex abundanti, be Particular.

2. { I distributing no Term / E two Terms. }

3. { O one only / A one only. } — In each of these cases *one* distribution is allowable in the Conclusion. But, by Rule 7, the Conclusion must be negative, *i.e.* distribute its Predicate: therefore, by Rule 5, the Subject may not be distributed.

MODES (OR MOODS) OF SIMPLE CATEGORICAL SYLLOGISM.

The Mode (or Mood) simply means *the enumeration of the Vowels symbolising the three Propositions of which a Simple Categorical Syllogism consists.*

Thus, on page 21,

The Mode of (1) is A A A.
(2) I A I.
(3) A E E.
(4) I E O.

The possible combinations of these four Vowels in threes are, of course, 64.

The Student will find it useful to make these combinations for himself; and then, in order to fix in his memory the chief General

Rules, to ascertain how many of such combinations are inadmissible when tested by those Rules.

Apply, *first*, the Rules affecting the Premisses, viz.

(*a*) Two Negative
(*b*) Particular } Premisses are inadmissible.

Next, the Rules regulating the dependence of the Conclusion on the Premisses, and of the Premisses on the Conclusion, viz.,

(*a*) A Negative Premiss necessitates a Negative Conclusion.
(*b*) A Conclusion implies Premiss.
(*c*) A Particular Premiss necessitates a Particular Conclusion.

It will be found that only 12 Moods survive the ordeal.

But the process is really superfluous; for we have next to consider

THE FIGURES OF SIMPLE CATEGORICAL SYLLOGISM.

The FIGURE of any such Syllogism *is determined by the position held in each of its Premisses by the (Third or)* MIDDLE TERM.

This may be	and the Figure is then named
Subject of both Premisses	Third.
Predicate of both	Second.
Subject of the Major Premiss / *Predicate of the Minor*	First.
Predicate of the Major Premiss / *Subject of the Minor*	Fourth.

(The Fourth Figure is useless, and may, in practice, be disregarded.)

Since each Premiss contains the Middle Term and one of the Terms of the Question or Conclusion, it is clear that *given the place held by the Middle Term, we know also the place, in its own Premiss, of either of the other two.*

The application of the General Rules of Syllogism to these known facts limits the capability of each Figure: these limitations have the name of SPECIAL RULES OF THE FIGURES.

It would be possible, of course, for the Student to discover these special Rules for himself; but the annexed Memoria Technica supplies them, and we need only concern ourselves with the proof of them.

[In making use of it, it must be understood that
the Symbol of the Major Premiss is placed first,
Minor second,
Conclusion last.

What denominates each Premiss is the presence of Major or of Minor Term: the order in which the Premisses are stated is, in itself, wholly immaterial. There are other uses of the Memoria Technica, which need not at present be noticed. *The Vowels in each Mood, and their order, is all we have now to regard.*

SIMPLE CATEGORICAL SYLLOGISM.

FIGURES OF:

	Subject.	Copula.	Predicate.	
Major Prem.	———		———	Fig. I.
Minor	———		———	
Conclusion	———		———	
Major Prem.	———		———	Fig. II.
Minor	———		———	
Conclusion	———		———	
Major Prem.	———		———	Fig. III.
Minor	———		———	
Conclusion	———		———	
Major Prem.	———		———	Fig. IV.
Minor	———		———	
Conclusion	———		———	

LEGITIMATE MOODS OF:

(Memoria Technica.)

I. BArbArA, CElArEnt, DArII, FErIO que *Prioris.*

II. CEsArE, CAmEstrEs, FEstInO, BArOkO, *Secundæ.*

III. *Tertia*—DArAptI, DIsAmIs, DAtIsI, FElAptOn, BOkArdO, FErIsOn, habet. *Quarta* insuper addit

IV. BrAmAntIp, CAmEnEs, DImArIs, FEsApO, FrEsIsOn.

Quinque subalterni * totidem Generalibus orti
[BArbArI, CElArOnt, CEsArO, CAmEstrOs, CAmEnOs,]
Nomen habent nullum nec, si benè colligis, usum.

* Conclusions being *Particular*, when they might have been *Universal.*

Assuming that this Memoria Technica is trustworthy, we will ascertain from it the Facts respecting each Figure.

Figure I. In each Mood

The first vowel is either A or E (not I or O);
hence, Fact 1—*The Major Premiss is always Universal.*

The second is A or I (not E or O);
hence, Fact 2—*The Minor Premiss is always Affirmative.*

The third is A, E, I or O;
hence, Fact 3—*The Conclusion is unrestricted.*

Applying the same kind of inspection to the remaining Figures we have the following results, viz.

Figure II.

Fact 1. *The Major Premiss is always Universal.*
2. *The Minor unrestricted.*
3. *The Conclusion always Negative.*

Figure III.

Fact 1. *The Major Premiss is unrestricted.*
2. *The Minor always Affirmative.*
3. *The Conclusion Particular.*

If these Facts can be accounted for, we shall prove them to be Rules.

In doing this it is necessary to remember,

(*a*) the position of the Middle and Major, Middle and Minor, Terms in the Premisses in each Figure;
(*b*) the chief general Rules of Simple Categorical Syllogisms: viz.

4. The Middle Term must be Subject of an Universal, or Predicate of a Negative, Premiss.
5. Against Illicit Process of Major or of Minor Term.
6. Two Negative Premisses are inadmissible.
7. A Negative Premiss necessitates a Negative Conclusion.
8. Two Particular Premisses are inadmissible.

Proofs of the Special Rules of the Figures.

Figure I. Rule 1.

The Minor Premiss must be Affirmative.

For suppose it Negative, then

(by Rule 6) the Major Premiss must be Affirmative,

(by Rule 7) the Conclusion Negative;

then the Major Term, undistributed as Predicate of the Affirmative Major Premiss, will be distributed as Predicate of the Negative Conclusion; and Rule 5 will be broken.

∴ *The Minor Premiss must be Affirmative.* Q. E. D.

Figure I. Rule 2.

The Major Premiss must be Universal.

For suppose it Particular, then

The Middle Term, holding the place of Subject, is not distributed; neither can it be distributed as Predicate of the Minor Premiss (which, by Rule 1, must be Affirmative), and Rule 4 will be broken.

∴ *The Major Premiss must be Universal.* Q. E. D.

Figure II. Rule 1.

One of the Premisses must be Negative.

Else Rule 4 will be broken, since the Middle Term is Predicate of both Premisses.

∴ *One of the Premisses must be Negative.* Q. E. D.

Corollary (by Rule 7),

The Conclusion must be Negative.

Figure II. Rule 2.

The Major Premiss must be Universal.

Since, by the Corollary to Rule 1, the Conclusion is Negative, the Major Term must be in it distributed; but as Subject of the Major Premiss it could not be distributed if that Premiss were Particular, and so Rule 5 would be broken.

∴ *The Major Premiss must be Universal.* Q. E. D.

Figure III. Rule 1.

The Minor Premiss must be Affirmative.

[Proof the same as for Figure I.]

Figure III. Rule 2.

The Conclusion must be Particular.

The Minor Term is Predicate of the Minor Premiss, which, by the last Rule, is Affirmative:

∴ the Minor Term is not therein distributed:

but if the Conclusion were Universal, the Minor Term (being its Subject) would be distributed, and thus Rule 5 would be broken.

∴ *The Conclusion must be Particular.* Q. E. D.

Summary of the Special Rules of the Figures.

FIGURE I.

(1) Minor Premiss Affirmative, *else* Illicit Process of Major Term.

(2) Major Premiss Universal, *else* Middle Term undistributed.

FIGURE II.

(1) One Premiss Negative, *else* Middle Term undistributed.

(2) Major Premiss Universal, *else* Illicit Process of Major Term.

FIGURE III.

(1) Minor Premiss Affirmative, *else* Illicit Process of Major Term.

(2) Conclusion Particular, *else* Illicit Process of Minor Term.

(It is well to charge the memory with thus much.

The Proofs will best be remembered by practising the statement of them.

If the Rules be forgotten, they may always be gathered as Facts from the Memoria Technica, if it be known, as it should be, by rote.)

At this point the Student will do well to exercise himself *thoroughly* in the Moods of Figures I, II, III.

Let him take Symbols as Terms, say

X for Minor Term,
Y Major ,
Z Middle ,

and construct Syllogisms, *beginning always from the* QUESTION.

Thus, suppose it be required to construct Syllogisms in dArII, fErIsOn, cEsArE, cElArEnt;

First, state the Quæstio, affix its symbol, add the name of the Mood required.

d Ar
I
I Some X + Y.

f Er
Is
On Some X — Y.

c Es
Ar
E No X — Y.

c El
Ar
Ent No X — Y.

Next, fill in Signs and Copulæ of the Premisses.

d Ar All +
I Some +
I Some X + Y.

f Er No —
Is Some +
On Some X — Y.

c Es No —
Ar All +
E No X — Y.

c El No —
Ar All +
Ent No X — Y.

Lastly, place the Middle Term, and then the Major and Minor Terms.

d Ar All Z + Y
I Some X + Z
I Some X + Y.

f Er No Z — Y
Is Some Z + X
On Some X — Y.

c Es No Y — Z
Ar All X + Z
E No X — Y.

c El No Z — Y
Ar All X + Z
Ent No X — Y.

When thus familiarised with the various Moods and Figures, he should proceed to construct Syllogisms with *significant* Terms in the Question.

FIRST, *Write down the Quæstio in strict Logical form* (i.e. Sign of Quantity—Subject—Copula—Predicate), *and affix the Symbol* (A, E, I or O).

NEXT, *Choose in what Mood of which Figure the Syllogism shall be constructed;* (remembering that no Affirmative Question can be proved in Fig. II; Universal in Fig. III).

NEXT, *as before, write down the name of that Mood.*

LASTLY, *fill in Signs and Copulæ, and place the Terms of the Question in their proper places, leaving void the place of the Middle Term.*

His Syllogism will then stand as in the following example:—

c El	No	—	valid.
Ar	This deed	+	
Ent	This deed	—	valid.

LOGIC *has now done all that it can, or proefsses to, do; it has shewn to what conditions the Third or Middle Term when found must conform.*

It does not profess to find Middle Terms; and, however absurd may be the Middle Term inserted, the *validity of the Inference* remains untouched: (although, of course, absurdity in the Conclusion arrived at guides the disputant to the absurd assumption or assumptions.)

Suppose I choose "Printed" as the Middle Term of the Syllogism above. If the Premisses are conceded the Conclusion must follow from them, and there would be no patent absurdity in the Conclusion.

If I want a really available Middle Term (or, as it used to be well named "Argument"), I must go to the legal practitioner, who would supply such as the following:—

"Insufficiently stamped"—"Not duly attested"—

"Obtained by fraud"—"Executed under compulsion."

Assuming him to know his business, the only chance of upsetting the Conclusion would be the possible falseness of the Minor Premiss.

Similarly, to prove "This man died of poisoning by arsenic," or "by strychnine," I must go to the medical man; and my only difficulty will be in the proof of my Minor Premiss.

What Moods and Figures to select must, after all, remain to be picked up by practice.

But in replying to a Syllogism the Rules of Opposition guide us.

If my adversary's Conclusion rests upon an Universal Premiss, I elect to prove, not its Contrary but, its Contradictory; which, if true, is incompatible with the truth of his Premiss and is easier of proof than the Contrary.

For this purpose, the third Figure is generally most convenient; because, as the Middle Term never stands as Predicate, a Singular Term will serve my purpose.

Say his Major Premiss has been—

"All Clerical Justices of the Peace are Liars;"

My answer would be,

f El A B	—	Liar.
Apt A B	+	Clerical Justice of the Peace.
On ∴ Some C. J. of P.	—	Liar.

Did I attempt to prove the Contrary of his Major Premiss I should find it difficult.

The analysis of Reasoning, as it is found in ordinary language, must be aided by instinct founded on practice.

It will generally be found easy to extract the Conclusion arrived at, state it in strict logical form, and then try it by the Rules.

Take for example the following:

"The cry of animals cannot always be depended upon as a proof that they are suffering pain. What a noise a pig will make when merely laid hold of!"

Here I take the statement controverted to be

A "All crying animals + suffering pain."

The laws of Opposition shew that the Contradictory is maintained by the writer,

O "Some crying animals − suffering pain."

I adopt the Mood fEl Apt On.

fEl No pigs merely laid hold of − suffering pain.
Apt All pigs ..... + crying animals.
O Some crying animals − suffering pain.

Or this,

"Those fellows not pirates! why, they'd British Bunting aboard! now they couldn't have bought it."

The position which the speaker lays down is,

A Those fellows + pirates.

The Syllogism is,

b Ar All having unbought, &c. + pirates.
b Ar Those fellows + having unbought, &c.
A Those fellows + pirates.

CHAPTER II.

OF ABBREVIATED OR ELLIPTICAL FORMS OF SYLLOGISM.

No one ever writes or speaks complete Syllogism.

The most usual form of ABBREVIATION is a Simple Categorical Syllogism, in the First Figure, from which one Premiss is omitted.

Speaking popularly, we either state the Principle and leave the Fact to be implied, or *vice versâ.*

Speaking technically, we either express the Major Premiss and leave the Minor Premiss to be implied, or *vice versâ.*

For example,

"Duelling is not socially-expedient: nothing morally wrong can be so."

Or,

"Duelling is not socially-expedient because it is morally wrong."

The Syllogism in its completeness being,

c El	No morally-wrong	—	socially-expedient.
Ar	All duelling	+	morally wrong.
Ent	No duelling	—	socially-expedient.

The Abbreviations above are named ENTHYMEME.

Some ENTHYMEMES admit of compression into a single Grammatical Proposition, which is then named ENTHYMEMATIC SENTENCE. Thus—

"Duelling being morally-wrong is not socially-expedient."

Another form of ABBREVIATION is that by which is omitted the Conclusion, sometimes one of the Premisses also, the person with whom we are arguing being presumed able to supply the omission.

This is chiefly applied to the third Figure.

Suppose my adversary's argument to have rested on, or his simple assertion to be,

"All rich people are hard hearted:"

I reply, "A. B. is not hard hearted, yet he is rich;"

or, "A. B. is not hard hearted."

"All eccentric people are clever:"

I reply, "A. B. is eccentric, but he is not clever;"

or, "A. B. is not clever;"

or, "A. B. is eccentric;"

accordingly as the presence of eccentricity or the absence of cleverness in A. B. is the more notorious.

The complete Syllogisms being respectively

	f El	A. B.	–	hard hearted.
	Apt	A. B.	+	rich.
	On	Some rich	–	hard hearted.
and	f El	A. B.	–	clever.
	Apt	A. B.	+	eccentric.
	On	Some eccentric	–	clever.

(The reason why this Figure of Syllogism is selected is that, since in this Figure alone the Middle Term is never Predicate, a Singular Term will serve the purpose.)

OF THE ABBREVIATION OF SEVERAL CONNECTED SIMPLE CATEGORICAL SYLLOGISMS.

A Question may require for its proof more than one Simple Categorical Syllogism: *i.e.*, one or both of its Premisses may become Questions in their turn. All the Syllogisms thus necessitated may be abbreviated in the form named

SORITES.

Sorites is *an abbreviation of two or more connected Simple Categorical Syllogisms in Figure I: in whose Antecedent the Minor Term is Subject of the first Premiss, the Major Term is Predicate of the last Premiss: the Middle Terms being alternately Predicates and Subjects of the Premisses.*

Example.

A B	+	human	}	*Antecedens.*
All human	+	animal		
All animal	+	living		
All living	+	corporeal		
No corporeal	−	immortal		
A B	−	immortal		*Consequens.*

Commencing with the Consequens (= Question or Conclusion) we obtain the following Simple Categorical Syllogisms :—

(The Figures 1, 2, 3, 4 denote the order of *Construction*; A, B, C, D the order of *Statement*.)

	c El	No corporeal	−	immortal.	
(D)	Ar	A B	+	corporeal.	(1)
	Ent	A B	−	immortal.	
	b Ar	All living	+	corporeal.	
(C)	b Ar	A B	+	living.	(2)
	A	A B	+	corporeal.	
	b Ar	All animal	+	living.	
(B)	b Ar	A B	+	animal.	(3)
	A	A B	+	living.	
	b Ar	All human	+	animal.	
(A)	b Ar	A B	+	human.	(4)
	A	A B	+	animal.	

Upon comparison of the Sorites with these Syllogisms into which it is expanded (1, 2, 3, 4) we find the following

FACTS OF SORITES.

1. The whole number of Propositions being 6,
   ..... Syllogisms is 4. (=the number of *intermediate* Propositions.)
2. All the *intermediate* Propositions are Major Premisses of Syllogisms in Fig. I.
3. The only *expressed* Minor Premiss is the first Proposition in the Sorites.
4. All the *suppressed* Minor Premisses are Conclusions, in each case, of the Syllogism immediately preceding.

Hence we derive the

RULES OF SORITES.

1. *Every Sorites may be expanded into as many Simple Categorical Syllogisms in Fig. I. as there are intermediate Propositions in it.*
2. *Every intermediate Premiss must be Universal* (by Special Rule 2 of Fig. I).
3. *The first Premiss alone may be Particular* (because it alone does not serve as a Major Premiss).
4. *No suppressed Conclusion may be Negative* (by Special Rule 1 of Fig. I).
5. *Nor any Premiss which produces a suppressed Conclusion* (by General Rule 7).
6. *The last Premiss alone may be Negative* (because the Conclusion which it produces is not used as a Minor Premiss).

Summary.

In the Antecedent of a Sorites

Only the first Premiss may be Particular.

..... last ..... Negative.

REDUCTION.

This name is given to *the process of changing any Simple Categorical Syllogism in Figures II, III (or IV), into an equivalent Syllogism in the First Figure.*

Except as an exercise it is useless, and belongs to an obsolete superstition that the First Figure is superior to the rest.

This is implied in the name REDUCTION or "bringing back." (Thus Hooker speaks of those who "reform a decayed estate by *reducing* it to the perfection from which it hath swerved.")

If a Syllogism in Fig. II or III is valid, nothing can be gained, though something may be lost, by torturing it into a Mood of the First Figure.

CHAPTER III.

OF HYPOTHETICAL SYLLOGISM.

HYPOTHETICAL SYLLOGISM is *that wherein one or more Propositions are hypothetical.*

HYPOTHETICAL PROPOSITION is *two, or more, Categorical Propositions welded into one by a Conjunction, or by Conjunctions.*

It is divided into

CONDITIONAL, *wherein two Categorical Propositions are connected by "If" placed before the first.*

DISJUNCTIVE, *wherein any number of Categorical Propositions are connected by "Or" placed between first and second, second and third, &c.*

Examples.

CONDITIONAL—"If A B committed the murder, A B deserves to be hanged."

DISJUNCTIVE—"A B is mad, or he is drunk, or he is a fool."

What is asserted in either form is the interdependence of the several Propositions.

Thus, in the first, it is not asserted that A B committed the murder, nor that he deserves hanging; but that, granting the first Proposition, the second will also be maintained.

Hence, the first is called ANTECEDENT,
second CONSEQUENT.

In the second, that some one of the three is maintained.

(It is plain that the Disjunctive Proposition may easily be stated in the Conditional Form.

If A B is mad, he is neither drunk nor a fool.

If A B is not mad, he is either drunk or a fool, &c.

Hence it is only necessary to give Rules for)

CONDITIONAL SYLLOGISM.

That most in use is *that wherein the Major Premiss is Conditional, and Minor Premiss and Conclusion may be Disjunctive.*

It is divided on two principles,

a. ACCORDING TO THE NATURE OF THE MAJOR PREMISS.

(1) If this consists of *one* Conditional Proposition, the Syllogism is called SIMPLE.

(2) If of *more,* the Syllogism is called COMPLEX.

b. ACCORDING TO THE NATURE OF THE MINOR PREMISS.

(1) If this is *Affirmative,* the Syllogism is called CONSTRUCTIVE;

(2) If *Negative,* DESTRUCTIVE.

We have thus—

Simple { Constructive. / Destructive.

Complex { Constructive. / Destructive.

THE RULES OF SIMPLE CONDITIONAL SYLLOGISM

Are derived from those of Simple Categorical Syllogism.

Every Universal Affirmative Proposition may be exhibited in the Conditional Form; thus,

"All good + happy" = "If A B + good, A B + happy."

We will therefore make four simple Categorical Syllogisms with the Major Premiss, "All good + happy;" and bracket with it its equivalent Conditional.

	If A B + good, A B + happy	
bAr	All good + happy	(1)
bAr	A B + good	
A	A B + happy.	
	If A B + good, A B + happy	
A	All good + happy	(2)
A	A B + happy	
A	A B + good.	
	If A B + good, A B + happy	
cAm	All good + happy	(3)
Es	A B — happy	
trEs	A B — good.	
	If A B + good, A B + happy	
A	All good + happy	(4)
E	A B — good	
E	A B — happy.	

Examining these as Categorical Syllogisms, we find that

(1) is correct in Barbara;

(3) Camestres;

(2) is faulty, being in Figure II without a negative Premiss;

(4) is faulty, being in Figure I with a negative Minor Premiss.

Then *taking them as Conditional Syllogisms,* we find that

(1) is *Constructive;* and that, the Minor Premiss having affirmed the Antecedent, the Conclusion has affirmed the Consequent:

(3) is *Destructive;* and that, the Minor Premiss having denied the Consequent, the Conclusion has denied the Antecedent.

The Rules therefore of Conditional Syllogism are,

1. *If the Antecedent is affirmed, the Consequent must be affirmed.*

2. *If the Consequent is denied, the Antecedent must be denied.*

(2) in which the Consequent is affirmed,
(4) in which the Antecedent is denied,
} are *both invalid.*

THE RULES OF COMPLEX CONDITIONAL SYLLOGISM.

The same Rules apply to Complex Conditional Syllogism, with this addition, that, whenever the Major Premiss has more than one Antecedent, or more than one Consequent, the affirmation or denial in the Minor Premiss and in the Conclusion must be *Disjunctive.*

1. If the Antecedent is affirmed (categorically or disjunctively), the Consequent must be affirmed (categorically or disjunctively).

2. If the Consequent is denied (categorically or disjunctively), the Antecedent must be denied (categorically or disjunctively).

We will next give two or three Examples of that kind of Complex Conditional Syllogism which is most often employed.

A (1).

Major Premiss { If this counsel + from above It + irresistible.
If this counsel + from man It + sure to fail.

Disjunctive Minor Prem. { either, This counsel + from above,
or, This counsel + from man.

Disjunctive Conclusion { ∴ either, This counsel + irresistible,
or, This counsel + sure to fail.

A (2).

Major Premiss { If this counsel + irresistible, / If this counsel + sure to fail, } It + to be let alone.

Disjunctive Minor Prem. { either, This counsel + irresistible, / or, This counsel + sure to fail;

Categorical Conclusion { ∴ This counsel + to be let alone.

B (1).

Major Premiss { If a Monarch + uncontrolled He + Tyrant. / If a Monarch + controlled He + Cypher.

Disjunctive Minor Prem. { either, a Monarch + uncontrolled, / or, a Monarch + controlled;

Disjunctive Conclusion { ∴ either, He + Tyrant, / or, He + Cypher.

B (2).

Major Premiss { If a Monarch + Tyrant, Monarchy + dangerous. / If a Monarch + Cypher, Monarchy + useless.

Disjunctive Minor Prem. { either, A Monarch + Tyrant, / or, A Monarch + Cypher;

Disjunctive Conclusion { ∴ either, Monarchy + Dangerous, / or, Monarchy + Useless.

B (3).

Major Premiss { If Monarchy + dangerous, / If Monarchy + useless, } Monarchy + to be abolished.

Disjunctive Minor Prem. { either, Monarchy + dangerous, / or, Monarchy + useless ;

Categorical Conclusion } ∴ Monarchy + to be abolished.

C.

Major Premiss { If I + in training, I + unable to read. / If I − in training, I + unable to pull at Putney.

Disjunctive Minor Prem. { either, I + in training, / or, I − in training ;

Disjunctive Conclusion { ∴ either, I + unable to read, / or, I + unable to pull at Putney.

(1) In Syllogisms A (1), B (2) and (3), and in C,

The Major Premiss consists of *two* Conditional Propositions whereof each has a different Antecedent and a different Consequent; and, the Minor Premiss disjunctively affirming the Antecedents, the Conclusion disjunctively affirms the Consequents.

Each is an Example of Constructive Dilemma.

Three points are to be noticed—

1. The Logical Validity.
2. The Material .....
3. The Rhetorical ....

1. *The Logical Validity* of these (as of any other) Syllogisms depends upon the observance of the Logical rules of inference: *i.e.* the Premisses being assumed *must* the Conclusion be admitted?

2. *The Material Validity* depends on the truth of the Minor Premiss; in other words, on the Minor Premiss really exhausting all possible alternatives; hence, the name DILEMMA (etymologically "double assumption," or, possibly, "two choices") is *sometimes extended to all complex conditional Syllogisms in which the Minor Premiss exhausts all alternatives:* but we popularly speak of the "horns" of a Dilemma.

In Syllogism A (1), and in C, the Minor Premiss is indisputable.

In Syllogism B (1), and (derivatively) in B (2), the Minor Premiss is disputable; for a Monarch need not be wholly controlled, or wholly uncontrolled.

The Rhetorical Validity consists in the equal unacceptableness, *to our opponent,* of the alternative conclusions.

In this view A (1), B (2), and B (3) are *rhetorically* valid.

But in C, the first alternative is unacceptable to the youth's Parent, Guardian, or Tutor; the second only to himself, or, possibly, to the Captain of the University Boat.

A (2) and B (3) are CONSTRUCTIVE COMPLEX CONDITIONAL SYLLOGISMS, wherein the Major Premiss consists of two Conditional Propositions, each having a different antecedent but a common consequent; the advantage of this form being that the single consequent rests on two alternatives, one of which it has been shewn must be true.

(*Rhetorically*, however, neither of these Syllogisms would be expressed, because they blunt the edge of the Dilemmas.)

Of course any Complex Conditional Syllogism, and therefore any Dilemma, may be in the Destructive Form.

CHAPTER IV.

OF FALLACY.

A Fallacy is an Argument which affects to be valid, but is not,

a. Either because some Logical Rule has been violated;

b. Or, Because a false Premiss has been assumed.

Beyond this it is not intended to classify or give names to Fallacies.

An example of each is subjoined.

A.—1. *Faulty Conversion.*

All clever men	+	eccentric.	A
∴ All eccentric men	+	clever.	A

Whereas all that is implied is that

Some eccentric men	+	clever.	I

2. *Faulty Opposition.*

All testimony to miracles	+	to be accepted.	A	false.
∴ No testimony to miracles	−	to be accepted.	E	false.

Instead of

Some testimony to miracles	−	to be accepted.	O	true.

B.—*False Premiss.*

All who are red in the face, and breathe stertorously + drunk.

A B + red in the face, &c.

∴ A B + drunk.

(*The Police Fallacy.*)

The Major Premiss is not true.

It is grounded really upon the faulty Conversion of

"All drunk + red in the face," &c.

It was stated (on Page 2) that no other than the *present* Tense of the verb "TO BE" is admissible as Copula. The reason is that any variation amounts to introducing one other Term at least.

Thus (Whately)—

All civilised are whites.

The Gauls were whites.

∴ They were civilised.

Besides the fault involved in the non-distribution (by Rule 1 of Figure II) we have here five Terms instead of only three.

(1) (2)
All who are civilised + whites.

(5) (3)
The Gauls + people who were whites.

(5) (4)
The Gauls + people who were civilised.

PART III.

CHAPTER I.

THE laws of Syllogism may be illustrated by the use of Symbols only; and wherever hitherto we have employed *significant* Terms it has been assumed that such Terms were unambiguous. In practice, however, this is not so. A wise reasoner will always insist that the Terms of the QUESTION shall be distinctly understood, before the discussion begins, by himself, and also (if so be) by the other party to the discussion.

But, even so, the MIDDLE TERMS subsequently introduced may be either in themselves ambiguous, or not understood in the same sense by both disputants.

It is essential to all right Reasoning that every Term employed shall be clearly *defined:* the ultimate purpose, therefore, now in view is to ascertain the LAWS OF LOGICAL DEFINITION.

OF PREDICABLES.

It was stated (Page 3) that the word PREDICATE is unavoidably ambiguous, and means either *the attribute Predicated,* or *the Term Predicated.*

Any Term predicated must be capable of being predicated, *i.e.* (a) PREDICABLE.

What then constitutes this PREDICABILITY?

1. The power of CONNOTING (signifying the presence of) some Attribute, or aggregate of Attributes, in a Subject.
2. The power of DENOTING (being the common name of) any and every Subject in which such Attribute &c. exists, or is, by the person using the Term, supposed to exist.

Every PREDICABLE is said to be,
in right of the first power, a CONCRETE
..... second ....., a COMMON } Term.

[The Student must here be reminded that by TERM is meant the verbal representative of (and practically the substitute for) an Idea, simple or complex; whether such Idea be, in any given language, capable of being expressed by one or by more grammatical words. It is simply for convenience that, in illustration, such Ideas are chosen as can be expressed by one grammatical word: just as it is sometimes more convenient to use one coin, cheque, or note, instead of many coins of equal value.]

Thus Hard, Solid, Just, Dishonest, are

CONCRETE TERMS, because they signify the presence of the Attributes Hardness, Solidity, Justice, Dishonesty;

COMMON TERMS, because they may be the common name of any and every Subject in which these Attributes respectively exist, or are supposed to exist.

Hardness, Solidity, Justice, Dishonesty, are named ABSTRACT TERMS, because they denote Attributes conceived of as existing apart from any Subject.

But how are the Ideas of these Attributes arrived at?

By means first of our Senses, next of our Intellect, we perceive similar Quality, Attribute (or aggregate of these), in several instances; this similarity we assume to be identity, and thus gain an Idea, which is thereafter *abstracted, i.e.* viewed independently of all other attendant circumstances in each instance.

Thus almost, probably quite, from the moment of birth an Infant receives an impression from contact with some substances wholly different from that which it receives by contact with others. It thus gradually gains the ABSTRACT IDEAS represented by the Abstract Terms—Hardness, Solidity, Sweetness, Softness.

When intellectual and moral perception awakes, the Child receives, through those media, by reflexion on some actions impressions wholly different from those received by reflexion on others. It thus gains gradually the ABSTRACT IDEAS represented by the ABSTRACT TERMS—Kindness, Crossness, Rightness, Wrongness.

The ABSTRACT TERMS are in each case exchanged (for convenience) for the CONCRETE TERMS which *connote,* instead of *denoting,* the Abstract Ideas.

The statements—

"Nurse is { cross," / unkind," / kind," / unjust,"

take the place of the statements—

{ "crossness / "unkindness / "kindness / "unjustness } exist in Nurse."

And these CONCRETE TERMS are thenceforward ready to be applied to (*i.e. denote,* be the common name of, be predicated of) any substances or actions which, in the child's judgment, resemble those from which respectively the ABSTRACT IDEAS were gained.

(Those who have watched the ways of children will have noticed how apt they are to apply to every quadruped of a certain size the name, generally unintelligible, which they have once given to any one such quadruped.)

It cannot, of course, be *proved* that an infant or a child goes through any of these mental processes, since we all forget our first experiences in infancy and childhood.

But let any grown-up person try the experiment of finding a COMMON NAME which shall be applicable to (*i.e. Predicable of*) every thing upon a well-littered study-table, from which shall be supposed to be excluded all raw products and all forms of animal or vegetable life.

Consciously or unconsciously, he must go through the process of ABSTRACTION: which has been well defined, by

Aldrich, as "*the regarding in a number of individual objects* ONLY *their points of agreement.*"

Say that the point he fixes upon is "manufactured-ness."

He must at least have put out of view such differences as the following:

a. Some belong to the animal kingdom, some to the mineral, some to the vegetable.

b. The various uses for which each is made.

Next let an orange be placed on the table,
or his favorite kitten jump up on it,
or a spider drop on it.

If he is to frame a Term which shall be predicable of these new objects as well as of those which were there before he must repeat his ABSTRACTION; *i.e.* he must discard more *differences.*

Or, let us take the quadrilateral plane rectilineal Figures defined in the first book of Euclid—

To give a common Name to	*must be dropped*
(1) Square and Rectangle . .	Equilateral-ness.
(2) Square and Rhombus . .	Right-angled-ness.
(3) Square, Rectangle, Rhombus, Rhomboid . .	both Attributes named above.

Summary.

Every PREDICABLE TERM must be—

A. *Concrete.*

B. *Common.*

In the first capacity it is a grammatical device for superseding an awkwardness of Language. (See Page 3.)

In the second it has three functions;

1. It *connotes.*
2. It is *capable of denoting.*
3. (As soon as predicated, but not before,)

It actually denotes any and every Subject of which it is predicated.

(Printed labels *connote* as soon as printed:

..... *can denote* any and every vessel containing the substance connoted.

..... *do denote* only those vessels to which they are actually attached.)

Since the ABSTRACT IDEA connoted by a PREDICABLE is gained only by discarding differences, it follows that

The more Attributes any Predicable connotes the fewer Individuals can it denote (and vice versâ).

Thus—

SQUARE *connotes all that* RECTANGLE does + another Attribute.

RECTANGLE ..... PARALLELOGRAM does + ...

PARALLELOGRAM ..... PLANE QUADRILATERAL / RECTILINEAL FIGURE } does + ...

But

PLANE QUADRILATERAL / RECTILINEAL FIGURE } *can denote* more Figures than PARALLELOGRAM can.

PARALLELOGRAM ..... RECTANGLE can.

RECTANGLE ..... SQUARE can.

CHAPTER II.

—

CLASSIFICATION OF PREDICATED PREDICABLES.

PREDICATED PREDICABLES are classified according to the relation subsisting (or by the Predicator conceived to subsist) between

1. The ABSTRACT QUALITY (or Attribute) *connoted* by any Predicable, and
2. The SUBJECT of which it is actually predicated (*i.e.* which it actually *denotes*).

Thus "Cold" always connotes "Coldness."

But in the following Propositions,

Air + Cold,
Ice + Cold,

the relation of Coldness to Air is contingent,

..... Ice is necessary;

consequently the Predicable "Cold," when Predicated in the one of these Propositions, will have a name different to that which it will have when Predicated in the other.

If the abstract quality, connoted by the Predicable, be (or by the Predicator be conceived to be) of the Subject denoted by it	*The Predicable is named*
1. The whole Essence	1. Species.
2. Part common (of the whole Essence) . . .	2. Genus.
3. Part distinctive (of the whole Essence) . . .	3. Differentia.
4. Joined (to the whole Essence) necessarily	4. Proprium.
5. Joined (to any Individual in whom the whole Essence exists) contingently	5. Accidens.

NOTE.—By the word ESSENCE is meant the aggregate of those ideas which, in the view of the Predicator, make up the idea of the Subject.

> Logic is the Judge, whose province is to lay down the law; not the Jury, whose province is to determine whether a particular set of facts fall under a particular law.

Therefore, in any illustrations which may be given in this part of the Treatise, I regard it as immaterial whether, as matters of fact, such illustrations are unimpeachable: that is a question which, if I may be allowed so to express my meaning, I do not allow to be raised.

Examples.

Suppose that I have before me any number of Plane Rectilineal Quadrilateral Figures, *agreeing* in that their opposite sides are parallel, *differing* in that some are rectangular and equilateral, some rectangular but not equilateral, some equilateral but not rectangular, some neither

equilateral nor rectangular; the greatest amount of agreement I can find by Abstraction (*i.e.* by discarding all differences) is *that they are, each and all, Plane Rectilineal Quadrilateral Figure, having the opposite sides parallel:* or, in one word, "Parallelogram-ness." I convert this Abstract Term into the Concrete "Parallelogram," which then becomes Predicable of each and all.

I proceed to Predicate it thus:—

All these Figures + Parallelogram.

The name of the Predicable in this Proposition is GENUS, because the Abstract Term connoted conveys to my apprehension all the ideas common to the differing Figures.

Suppose that I then make a selection and say,

All these Figures	+	Square,
All those	+	Rectangle,
All these	+	Rhombus,
All those	+	Rhomboid,

the name of each of these Predicables will be SPECIES, because each connotes all the ideas which, to my apprehension, make up the idea of the Subject of which it has been predicated.

If I say,

This Rectangle	+	6 inches long × 4 deep,
This Square	+	9 inches .... × 9 ....

the name of the Predicables will be ACCIDENS, because the ideas connoted do not enter into my conception of the idea represented by Rectangle or Square.

If I say,

All Parallelogams + having opposite sides and angles equal,

the name of the Predicable will be PROPRIUM, because the idea connoted by it is joined necessarily to that aggregate of ideas which make up my idea of the Subject of which it is predicated, but does not form one of that aggregate.

If I say,

All circles + { having a point within from which all lines drawn to the circumference are equal,

the Predicable will be named DIFFERENTIA, because the idea connoted by it is that part of the idea of the Subject which distinguishes it from all other Plane Figures contained by one line.

NOTE.—Whether the name DIFFERENTIA or PROPRIUM shall be given to any Predicated Predicable, depends entirely on the conception formed by the Predicator of the relation between the quality connoted by the Predicable, and the idea he has formed of the Subject of which it is predicated.

Thus it has long been assumed that *Rationality* is a quality universally and exclusively forming the distinctive part of the Essence of Man.

In this view *Rational*, when Predicated of Man, will be named DIFFERENTIA.

Others may think that *Articulate-speech* is the distinctive part of the Essence of Man.

In this view *Articulately-speaking*, when Predicated of Man, will be named DIFFERENTIA; whereas, under the first supposition, it will be named PROPRIUM.

Since all Squares, Rectangles, Rhombi, Rhomboids are Parallelogram, it is plain that whatever may be predicated of Parallelogram may also be predicated of each of the other Figures.

This necessitates *subdivision of the first four Classes of Predicables given above;* viz. SPECIES, GENUS, DIFFERENTIA, and PROPRIUM.

To make this part of the Subject clear, we must make a set of COGNATE PREDICABLES, *i.e. Predicables connoting Abstract Ideas gained by analysing one Complex Idea.*

For this purpose it is advisable to adhere to the old established example.

Let us then take *any* individual Men, (say)

Nero, John Bunyan, Napoleon I.

Let it be assumed that

The whole Essence of these—"the whole that any *common* Term can express" (Whately)—is Humanity;

		PART COMMON	+	PART DISTINCTIVE.
that Humanity is divisible into		Animality	+	Rationality,
.... Animality	.....	Life	+	Sentience,
.... Life	.....	Corporeity	+	Vital Principle,
.... Corporeity	.....	Substance	+	Form,
.... Substance is indivisible.				

Let it be further assumed that to

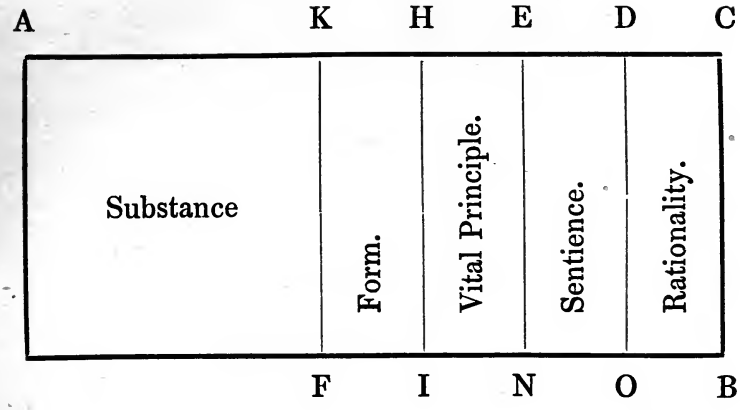
Humanity is necessarily joined		Power of Speech,
Animality	.....	Spontaneous Motion,
Life	.....	Requirement of Sustenance,
Corporeity	.....	X. Y. Z.
Substance	....	Palpability;

it is clear that in the one complex idea HUMANITY are involved, at least,

Rationality,
Animality,
Life,
Sentience,
Corporeity,
Vital Principle,
Substance,
Form,
Power of Speech,
Spontaneous Motion,
Requirement of Sustenance,
X. Y. Z.
Palpability ;

and that Predicables connoting each of these Abstracts may be Predicated of All Men,
or, of Humanity.

The annexed Diagram illustrates this process of continued Abstraction.



Let

AB = Humanity, divided into AO = Animality and DB = Rationality.

AO = Animality, ... AN = Life ..... EO = Sentience.

AN = Life, ... AI = Corporeity .... HN = Vital Principle.

AI = Corporeity, ... AF = Substance .... KI = Form.

AF = Substance (assumed to be) indivisible.

At each step, it will be seen, is dropped the *Part Distinctive*, ... left ..... *Common;* the latter being again divided until is left an Idea (which we assume to be) incapable of further analysis.

The Ideas *joined necessarily* to AB, AO, AN, AI, AF may be conceived of as *welded externally* to each.

Of the Ideas *joined contingently* to Individuals who partake of AB &c. we take no account.

It will be convenient next to exhibit side by side

(*a*) the results of this continued Abstraction; and

(*b*) the Predicables which connote them.

Since it is assumed that

"Need of sustenance" is *necessarily joined* to the Essence of "Life;"

"Needing sustenance" will be called, when predicated of "all Living," PROPRIUM (simply); when predicated of

"All Animal," or
"All Human," } GENERIC PROPRIUM.

Again, "Vital Principle" being assumed to be *the Part Distinctive* of the Essence of "Life," "Having Vital Principle" (*i.e.* "Animated") will be called,

when predicated of "All Living," SPECIFIC DIFFERENTIA;

..... { "All Animal," / "All Human," } GENERIC DIFFERENTIA.

"Corporeity" being assumed to be *the Part Common* of the Essence of "Life," "Corporeal" will be called,

when predicated of "All Living," GENUS (simply);

..... { "All Animal," / "All Human," } REMOTE GENUS.

AGAIN, since it is clear that

All Human	+	Animal,
All Animal	+	Living,
All Living	+	Corporeal,
All Corporeal	+	Substantial;

those cognate Predicables which are alternately Predicates and Subjects are called GENERA when Predicated, SPECIES when they are Subjects;

for Animality is the part common of the Essence of Humanity,

Life	.....	Animality,
Corporeity	.....	Life,
Substance	.....	Corporeity.

That one Predicable which does not, and on our assumption cannot, become a Subject is called GENUS SUMMUM.

That which does not become a Predicate (but is Predicable of Individuals only) is called SPECIES simply (sometimes *Infima*).

TERMS REPRESENTING ABSTRACT IDEAS.

Joined necessarily to the whole Essence.			*Part Common.*	*Part Distinctive.*
Palpability	∝	Substance		
X. Y. Z.	∝	Corporeity	= Substance	+ Form
Need of Sustenance	∝	Life	= Corporeity	+ Vital Principle.
Spontaneous Motion	∝	Animality	= Life	+ Sentience
Power of Speech	∝	Humanity	= Animality	+ Rationality

Nero, John Bunyan, Napoleon I.

THE CONCRETE TERMS, *i.e.* PREDICABLES.

Propria.		*Genera.*	*Differentiæ.*
Palpable	∝ Substantial		
Having X. Y. Z.	∝ Corporeal	= Substantial	+ Formed.
Needing Sustenance	∝ Living	= Corporeal	+ Animated.
Spontaneously Moving	∝ Animal	= Living	+ Sentient.
Having Power of Speech	∝ Human	= Animal	+ Rational.

Nero, John Bunyan, Napoleon I.

Thus we obtain four additional classes.

If the Quality *connoted* by any Predicable be (or be conceived of as being) of the Subject *denoted* by it,	The Predicable is named
1. Part of the Part Common of the whole Essence, . . .	1. *Remote* GENUS.
2. Distinctive Part of Part of the Part Common of the whole Essence, . . .	2. *Generic* DIFFERENTIA.
3. Necessarily joined to Part of the Part Common of the whole Essence, . . .	3. *Generic* PROPRIUM.
4. Indivisible Part of the Part Common of the whole Essence, ...	4. *Summum* GENUS.

FOR EXAMPLE,

(*a*) "Every Hexagon + having its interior angles equal to twice as many right $\angle s - 4$ as it has sides,"—(*Generic* PROPRIUM.)

The Quality here predicated belongs to a Hexagon, because

"Every Hexagon + Plane Rectilineal Figure;"

but it is necessarily joined to the whole Essence of Plane Rectilineal Figure.

(*b*) "Every Square + having opposite sides Parallel,"—
(*Generic* DIFFERENTIA,)
because the Predicable is DIFFERENTIA when Predicated of Parallelogram, and Parallelogram is *Remote* GENUS when Predicated of Square.

(*c*) "Every Square + Plane Figure."—(*Remote* GENUS.)
(*d*) ..... + Figure,"—(*Summum* GENUS.)

CHAPTER III.

OF LOGICAL DIVISION AND OF LOGICAL DEFINITION.

Both of these apply to TERMS: the need for either arises simply from the fact that Language is practically the only means whereby we can convey to one another (perhaps even to our own minds) Ideas.

When a Term *denotes too widely* we must DIVIDE.
..... *connotes too much* ..... DEFINE.

Thus, FIGURE denotes too widely, and must be Divided;
..... SQUARE connotes too much, and must be Defined.

Construct, from any number of Individual Squares, a table of COGNATE PREDICABLES (omitting Propria).

		Genus.	*Differentia.*
Figure			
Plane Figure	=	Figure	+ Contained by line or lines.
Plane Rectilineal Figure	=	Plane Figure	+ Contained by straight lines.
Plane Quadrilateral Rectilineal Figure	=	Plane Rectilineal Figure.	+ Contained by four lines.
Parallelogram	=	Plane Quadrilateral Rectilineal Figure	+ Having opposite sides parallel.
Rectangle	=	Parallelogram	+ Right-angled.
Square	=	Rectangle	+ Equilateral.

A B C
(Individual Squares.)

By adding to	*The Term*	*We Divide*	*into*	*constitute the Class*
Figure	Plane	Figure	Plane and not-Plane	Plane Figure.
Plane Figure	contained by straight lines	Plane Figure	Plane Figure contained by one line, and not contained by one line	Plane Rectilineal Figure.
Plane Rectilineal Figure	Quadrilateral	Plane Rectilineal Figure	Quadrilateral and not Quadrilateral	Plane Rectilineal Quadrilateral Figure.
Plane Rectilineal Quadrilateral Figure	having the opposite sides parallel	Plane Rectilineal Quadrilateral Figure	Parallelogram and not-Parallelogram	Parallelogram.
Parallelogram	Right-Angled	Parallelogram	Rectangle and not-Rectangle	Rectangle.
Rectangle	Equilateral	Rectangle	Square and not-Square	Square.

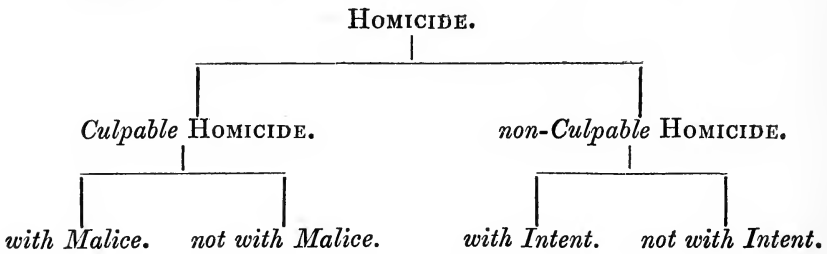
[We do not attempt to divide Square because we could only do so by adding ACCIDENS instead of, as in all preceding instances, DIFFERENTIA.

But if, by the same process, we had constituted the Class HUMAN, custom (not Logic) would allow of our adding Accidents such as connote Nationality, Profession, Trade, &c. &c., and constituting such Classes as French, German, Lawyer, Soldier, Merchant.]

We should thus have *divided* FIGURE into the Classes underwritten:

Solid Figure.
Circle.
Ellipse.
Non-Quadrilateral Rectilineal.
Trapezium.
Parallelogram, neither Rectangular nor Equilateral.
Rectangle.
Square.

Again,—



Here we have divided HOMICIDE into

Culpable with Malice . . . . = MURDER.
Culpable not with Malice . . . = MANSLAUGHTER.
Non-Culpable with Intent . . = JUSTIFIABLE.
Non-Culpable not with Intent . = HOMICIDE BY MISADVENTURE.

THE RULES OF LOGICAL DIVISION are,

1. *The Term which has been divided must be Predicable, of each of the Classes into which it has been divided, as* GENUS *or* REMOTE GENUS.
2. *No one of these Classes must* DENOTE *more than the Term divided.*
3. *These Classes must, in the aggregate,* DENOTE *exactly as much as the Term divided.*
4. *No two of these Classes may be capable of being predicated of one and the same subject at the same time.*

Rule 1 distinguishes Logical Division from Physical.

Thus COLLEGE may be Logically divided into Naval, Military, Theological, &c.

a College, Physically, into Governing Body and Governed Body.

Rule 2 is so obvious that it is not easy to find a probable example of violation of it.

Rule 3 can always be complied with by dividing into such as connote the quality added, and such as do not.

(For instance, above, Plane Rectilineal Figure has been divided into Quadrilateral and non-Quadrilateral.)

Rule 4. The violation of this Rule is commonly called *Cross* Division.

I may, for instance, direct a Library to be divided, *i.e.* classified, according to the size, *or* the sub-

ject, *or* the language of each volume; but it could not be arranged on two of these principles taken together. What could be done with a folio copy of a Greek Philosopher?

So I may divide Plane Rectilineal Triangle—

1. According to the relations of the angles, OR
2. ..... the sides;

but an equilateral triangle must be also an acute-angled triangle.

Similarly, to divide Plane-Rectilineal-Quadrilateral-Figure into Trapezium, Parallelogram, Rectangle, and Square, would be faulty; because Parallelogram is GENUS when predicated of Rectangle and Square.

OF LOGICAL DEFINITION.

Every Logical Definition is

An Universal Affirmative Proposition in which Genus-and-Differentia is predicated of Species.

Thus—

"All Murder + Culpable Homicide with Malice."
"All Square + Rectangle Equilateral."

It is always Definition of a Term.

Thus—"Murder" having been adopted as a convenient name for "culpable killing with malice;"

"Parallelogram" as a convenient substitute for "Figure Plane Rectilineal Quadrilateral, having the opposite sides parallel;"

Any one with whom one is arguing may wish to have either of these Terms analysed.

If in place of either we had used the full description no Definition would have been required; unless one of the Terms substituted should have required it, and that would only be because such Term admitted of analysis.

Thus it becomes a serious question in a trial for Murder, "What is Malice?" and it is a question to answer which one must have particular knowledge of Legal Phraseology.

For the Law in certain cases assumes "Malice," (or at least it did some time back,)—

If A, at the time engaged in an unlawful act, slew B, the Law found "Malice" for him;

(but we must not travel into Law or Ethics.)

When the analysis of the Term is complete the Logical Definition is a self-evident truth; because, as we have already seen,

SPECIES, *connoting* the whole Essence = Part Common + Part Distinctive of that whole Essence.

No Logical Definition can stand good unless the Proposition conveying it can be converted into an Universal Proposition. For example:

"All Human + Animal Rational."
"All Animal Rational + Human."

But an Universal Proposition can be similarly converted if the Predicate be { DIFFERENTIA / PROPRIUM } of the Subject (SPECIES).

"All Animal + Sentient." (DIFFERENTIA.)
"All Sentient + Animal."

And

"All Human + capable of Articulate Speech."
(PROPRIUM.)

"All capable, &c. + Human."

This is why, on Page 8, we said that it was (not true in fact but) assumed that no Affirmative Proposition distributes its Predicate;

For it is from our knowledge extra-logical,

..... not ..... logical;

that we can ever convert A into A.

When required to define a Term, the Logician asks himself—

1. "What Idea does that Term (to my mind) *connote?*"
2. (If that Idea is complex),

"Which is the *common* / ..... *distinctive* } part of it?"

This being ascertained, he exchanges his Abstract Terms for the Concrete, and states his Proposition.

For example:

He has stated, "Every Parallelogram has certain properties."

He is required to define "Parallelogram."

The Idea *connoted* being complex, he ascertains that it may be analysed into

1. The *common quality* of being Plane Rectilineal Quadrilateral Figure.
2. The *distinctive quality* of having the opposite sides Parallel.

He replies therefore,

"Every Parallelogram + Plane Rectilineal Quadrilateral Figure, having the opposite sides parallel."

OF DEFINITION OTHER THAN LOGICAL.

By adding to DEFINITION the term *Logical* we of course imply that there is DEFINITION *non-Logical.* This is of three kinds—*Accidental, Physical, Nominal.*

OF ACCIDENTAL DEFINITION.

DEFINITION, etymologically, = "the laying down of boundaries."

Boundaries prevent the confusion of one object with another: they do not necessarily help us to ascertain the real nature of any.

If a child ask, "*What is Gun-Cotton?*" the answer "Cotton, which does as well as Gun-Powder" is sufficient: for the child would thus be enabled to distinguish between Gun-Cotton and any substance he had yet known by the name of Cotton.

Accidental DEFINITION = "*An Universal Affirmative Proposition, in which Accidens, Proprium, Differentia* (or any combination of these) is predicated of the Subject."

Again: it may be required to secure that some *individual Subject* shall not be mistaken for any other.

"*What is the Speaker of the House of Commons?*" is a question which must be answered by a *Logical* DEFINITION of the Office.

"*Which is the Speaker?*" asked by a Stranger present at the House, can only be answered by an *Accidental* DEFINITION.

"The Speaker is that gentleman in the long wig and the gown sitting under the canopy."

"*Which is the Chairman of Committees?*"

"He is that gentleman who sits by himself in that seat in the middle of the House."

OF PHYSICAL DEFINITION.

If an adult ask, "*What is Gun-Cotton?*" he will expect an accurate account of the mode of preparation and of the chemical qualities of Gun-Cotton.

"All Gun-Cotton is, &c. &c.

OF NOMINAL DEFINITION.

If I have to send to a Library for a book, I *may* define it *accidentally* (and to an "*illiterate*" messenger I should do so).

"The book I want is the third, or the biggest, on such a shelf."

To an intelligent messenger I should state the title, that is to say, I should give a *Nominal* DEFINITION.

It would not follow that the messenger, however intelligent, should have any idea of the contents of the book.

The book I want is "The Anatomy of Melancholy."
..... "Bright's Praxis."
..... "Carpenter's Physiology."
..... "Sugden on Powers."

If he could read I should get the book.

All Terms also admit of *Nominal* DEFINITION, and chiefly in three ways.

1. By simply substituting a word equivalent in meaning but better known, either generally or to the person requiring such Definition.

For instance,

(*a*) Mr. Verdant Green asked his mother to send him "two Ponies:" had she asked for a nominal Definition, she would not have sent the two Shetlands.

(*b*) "Many Birds this year?" a child might say, "Yes," if sparrows were abundant: a tenant-farmer or a country gentleman would know he was asked about partridges exclusively.

2. In many cases giving the Etymology of a word amounts to a *Nominal* Definition; for instance, *Astronomy—Geography — indurated — hypertrophous — synchronous — insoluble.*

In other cases this would be insufficient, or even misleading; for instance, *Geology—Telegraph—Desirable Premises.*

3. To supplement the two former methods we must often trace the history of a Term; for instance, *Whig—Tory—Puritan—Astrology—Pagan—Title* (for holy orders)—*Committee — Non-suit — Culprit — Automaton — Christian — Telegraph—Desirable Premises.*

APPENDIX.

REDUCTION.

On page 43 has been expressed an opinion that REDUCTION, except as an exercise, is useless. However, since, as an exercise, it is generally required of Students, it must not be omitted in a Manual designed for their use.

REDUCTION is of two kinds: OSTENSIVE (or direct), and AD IMPOSSIBILE (or indirect).

OSTENSIVE REDUCTION depends for its validity

1. On the fact that a PREMISS is equally assumed and granted whether it stand as MAJOR or as MINOR.
2. On the rules of CONVERSION.

ITS RULES are contained in the Memoria Technica given on page 29.

Observe, first, that only four INITIAL CONSONANTS are employed throughout, as in the first Figure, viz. B, C, D, F.

1. In any other Figure than the first these Consonants indicate *the mood of the first Figure to which the given Syllogism is to be* REDUCED.
2. The OTHER SIGNIFICANT CONSONANTS are *m* (for mutandæ), indicating that in the given Syllogism *the Premisses are to be transposed; s* and *p*, indicating that *the Propositions whose Symbols they immediately follow are to be converted.*

For example,

Suppose it be required to REDUCE Syllogisms in the moods
(1) CAmEstrEs, (2) DIsAmIs, (3) FELAptOn.

The moods of the first Figure will be
in (1) CElArEnt,
(2) DArII,
(3) FErIO;
in (1) and (2) the Premisses must be transposed.

Conversion must be applied
in (1) to the Minor Premiss, before transposition, and to the Conclusion.
(2) to the Major Premiss, before transposition, and to the Conclusion.
(3) the only thing required is to convert the Minor Premiss.

(1)

CAm	All morally-responsible	+	rational.
Estr	No Brute	—	rational.
Es	No Brute	—	morally-responsible.

to

CEl	No rational	—	Brute.
Ar	All morally-responsible	+	rational.
Ent	No morally-responsible	—	Brute.

(2)

DIs	Some	War	+	justifiable.
Am	All	War	+	calamitous.
Is	Some	calamitous	+	justifiable.

to

DAr	All	War	+	calamitous.
I	Some	justifiable	+	War.
I	Some	justifiable	+	calamitous.

(3)

FEl	No	idiots	—	morally-responsible.
Apt	All	idiots	+	human.
On	Some	human	—	morally-responsible.

to

FEr	No	idiots	—	morally-responsible.
I	Some	human	+	idiots.
O	Some	human	—	morally-responsible.

In order to get rid of REDUCTION indirect have been substituted in the Memoria Technica for BArOKO .... FAkOrO (1)
BOkArdO .... DOkAmO (2)

The *m* indicates as before.

The *k* indicates that the form of the Premiss whose symbol it immediately follows is to be changed, and the changed Premiss converted. For example:

A	All honest	+	expedient.	O	Some glittering	—	gold.
E	No not-honest	—	expedient.	I	Some glittering	+	not-gold.
E	No expedient	—	not-honest.	I	Some not-gold	+	glittering.

(1)

FAk	All honest	+	just.
Or	Some enforcement of strict legal right	—	just.
O	Some	—	honest.

to

FEr	No not-just	—	honest.
I	Some enforcement, &c.	+	not-just.
O	Some	—	honest.

(2)

DOk	Some Athletic exercises	—	beneficial to health.
Am	All	+	intended to be beneficial to health.
O	Some intended to be beneficial to health	—	beneficial to health.

to

DAr	All Athletic exercises	+ {intended to be beneficial to health.
I	Some not beneficial to health	+ Athletic exercises.
I	Some	+ {intended to be beneficial to health.

II. Reduction ad Impossibile (indirect) is applied to the Moods BArOkO and BOkArdO, the *k* here indicating that *in place of the Premiss whose symbol it immediately follows is to be assumed the Contradictory of the conclusion of the Syllogism to be reduced.*

It is best understood by an example.

BOK	Some studies	— useful.
Ard	All studies	+ intended to be useful.
O	Some intended to be useful	— useful.

to

b Ar	All intended to be useful	+ useful.
b Ar	All studies	+ intended to be useful.
A	All studies	+ useful.

But the new Conclusion is the Contradictory of the former Major Premiss, which is assumed to be true;

∴ the new Conclusion is false.

∴ {either the reasoning is faulty,
or a false Premiss has been assumed.

The reasoning is not faulty, (but correct in BArbArA;)

∴ a false Premiss has been assumed:

but not the Minor, which has been assumed to be true;

∴ the Major.

∴ the old Conclusion (its Contradictory) is true.

OF INDUCTION AND EXAMPLE.

ALDRICH included both under ABBREVIATED SYLLOGISM.

It is useful to exhibit each in CATEGORICAL SYLLOGISM, in order to show that, in each, the Syllogism which exhibits either breaks the law of Categorical Syllogism, or assumes a Premiss which is *literally* false, (though it may be *practically* true.)

INDUCTION.

"A. B. C. (specimens of Magnet) attract iron,
∴ All magnets attract iron."

This may be exhibited in two forms of Categorical Syllogism.

(1)

A	A. B. C.	+	attractive of iron.
A	A. B. C.	+	magnets.
A	All magnets	+	attractive of iron.

In this case the Minor Term, undistributed as Predicate of an affirmative Premiss is distributed as Subject of an Universal Conclusion; i.e. there is *illicit process of the* MINOR TERM.

(2)

bAr	A. B. C.	+	attractive of iron.
bAr	All magnets	+	A. B. C.
A	∴	+	attractive of iron.

In this case the Minor Premiss is *literally* false: it assumes that which it is the (distinct) office of Inductive Reasoning to prove, viz. that the specimens are adequate representatives of the whole class called by the name "Magnet."

Example.

EXAMPLE is either identical with Induction (in form), or a Deductive Categorical Syllogism whose Major Premiss is supplied by Induction.

(I take again ALDRICH's instance).

"Cæsar and Pompey will tear the Country to pieces, for so did Sylla and Marius."

bAr	Sylla and Marius	+	tearers of the Country to pieces.
bAr	Cæsar and Pompey	+	Sylla and Marius, (*literally* false.)
A	Cæsar and Pompey	+	tearers of the Country to pieces.

(*or*)

bAr	All of the character of Sylla and Marius	+	tearers of the Country to pieces.
bAr	Cæsar and Pompey	+	of the character of Sylla and Marius.
A	Cæsar and Pompey	+	tearers of the Country to pieces.

The real difference between Induction and Example is in the matter with which they deal.

It is impossible to establish Uniformity of Law in respect to human conduct.

It is asserted to be possible in respect to physical facts.

Hence the sphere of Induction is Science, and its office is to convince.

The sphere of Example is Contingent matter, and its office is to persuade.

I subjoin a recent instance of reasoning by Example.

It has been said, that "the further Russia pushes her Empire towards India the weaker she must become"; and we are referred by way of Example to the Crimean War, the result of which is supposed to have established that "the farther from the base of operations Military operations are carried, the more exhausting they are." Admit this as proved by the Example quoted, and the conclusion logically follows.

THE END.

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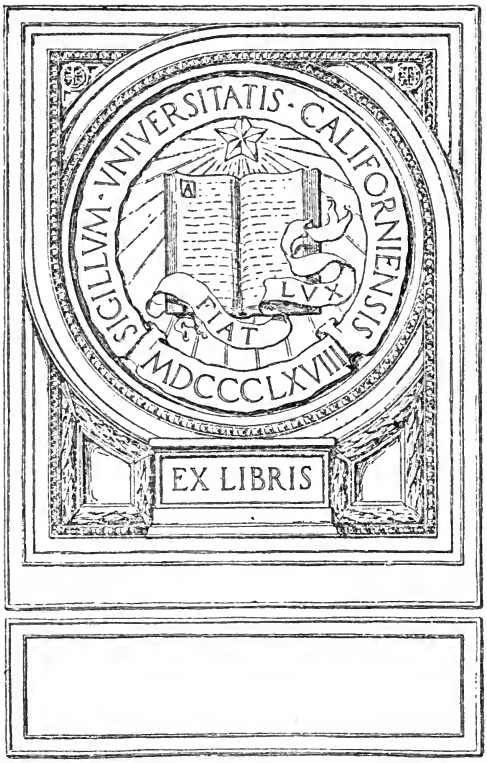
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UNIV. OF CALIFORNIA

A
First Book in Logic

BY
HENRY BRADFORD SMITH

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PREFACE

The recent developments in logical theory following upon the contributions of Boole, Pierce, and Schröder have seemed to place the subject beyond the reach of the average student and even in most instances beyond the reach of the technically equipped philosopher. The result has been to reduce the attention that was formerly given to elementary instruction in logic and to displace the traditional course from its originally dominant position in the university curriculum. The conviction is abroad that the ancient *organon* is so far inferior to the modern instrument perfected by the critical labors of Peano, Frege, Russell, and others, that it no longer deserves the attention once bestowed upon it. These objections the writer has endeavored to meet, in the first instance by introducing no symbols whatever, save the ones employed by traditional logic itself, so that the treatment may be followed by any intelligent reader, and secondly by keeping modern developments always in mind while following the traditional order of treatment. Finally, he has met the recent contention that the classical system does not hold true in all of its parts, by showing in the last chapter of this work that

this view is based upon a misapprehension. In completing the chapters dealing with the theoretical portion of the subject the writer has availed himself of parts of his *Letters on Logic,* which in turn is based upon a brief syllabus which Professor Singer once placed at his disposal, and also of parts of his recently published *Foundations of Formal Logic.*

H. B. S.

TERMS, RELATIONS, PROPOSITIONS

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CHAPTER I

INTRODUCTION TO INFERENCE

Every deductive science is concerned with a set of **relationships** which are peculiar to its domain or field of application, and a set of **objects** of which it is meaningful to say that they stand in these relationships to one another. Suppose a set of objects, *a, b, c,* etc., which stand for classes or groups of things, and the relation of **inclusion,** and consider the statement,

a is included in *b*.

If *a* stands for *Athenians* and *b* stands for *Greeks,* it is clear that the members of the *a* class are contained among the members of the *b* class and the statement that *a* is included in *b* is true. But if the case should be reversed and we should say,

b is included in *a,*

then it would be untrue, for not all Greeks are Athenians. Any statement that is either true or false is *meaningful; meaningless* if it be neither true nor false.

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b is included in *a,*

then it would be untrue, for not all Greeks are Athenians. Any statement that is either true or false is *meaningful; meaningless* if it be neither true nor false.

Suppose a set of objects, x, y, z, etc., and the relation of **implication,** and consider the statement,

x implies y.

Substitute here for x the expression, Socrates is a man, and for y the expression, Socrates is a mortal, and we have,

Socrates is a man implies
Socrates is a mortal,

the result, whether true or false, being at least meaningful. If we were to say, Socrates implies Greeks, we would say something that is neither true nor false. The expression would be meaningless because only of propositions (not of classes) can we say that the one *implies* the other.

Since the meaning of the objects and relationships with which a science deals will only appear when the science has been developed, it will not be possible to give an exact definition of the science with which we shall be concerned; but we may say that *logic* deals with propositions and with *inferences,* with classes and their *inclusion,* total or partial, with respect to one another.

PRELIMINARY DEFINITION OF THE SCIENCE

The most important matter with which logic is concerned is the matter of **inference.** Every man

reasons, and oftentimes, correctly enough, before he possesses any science of inference. It is the purpose of these chapters to enable the student to become aware of the *processes* which he employs habitually in his thinking; to enable him to distinguish, in as many cases as possible, a good argument from one that is fallacious; to enable him to argue with some consciousness of the misapprehensions that lead men to adopt erroneous opinions. *Inference* being, then, the most important matter with which the logician has to deal, we shall content ourselves with the following *preliminary* definition: *Logic is the science of inference necessary and probable.* Necessary inference corresponds broadly to what is called **deductive** logic, whereas probable inference is treated in another department of the subject, which is known as **inductive** logic. It is only with the science of necessary inference that the present work undertakes to deal.

LOGIC AND THE SCIENCES

Upon reflection the student will at once become aware that in all the sciences the drawing of inferences is customary and habitual, and we may adduce this fact as an additional reason for making a study of inference at first hand. Jevons remarks: "One name which has been given to Logic, namely

the Science of Sciences, very aptly describes the all-extensive power of logical principles. The cultivators of special branches of knowledge appear to have been fully aware of the allegiance they owe to the highest of the sciences, for they have usually given names implying this allegiance. The very name of logic occurs as part of nearly all the names recently adopted for the sciences, which are often vulgarly called the 'ologies,' but are really the 'logics,' the 'o' being only a connecting vowel or part of the previous word. Thus geology is logic applied to explain the formation of the earth's crust; biology is logic applied to the phenomena of life; psychology is logic applied to the nature of the mind. . . . Each science is thus distinctly confessed to be a special logic. The name of logic itself is derived from the common Greek word λόγος, which usually means *word,* or the sign and outward manifestation of any inward thought. But the same word was also used to denote the inward thought or reasoning of which words are the expression, and it is thus, probably, that later Greek writers on reasoning were led to call their science ἐπιστήμη λογική, or logical science; also τέχνη λογική, or logical art. The adjective λογική, being used alone, soon came to be the name of the science, just as Mathematic, Rhetoric, and other names ending in 'ic' were originally adjectives, but have been converted into substantives."

INTRODUCTION TO INFERENCE

INFERENCE AND ITS SIGNS

Whenever an inference is intended, we are usually made aware of the fact by the occurrence of some typical word: *hence; therefore; accordingly; if, then; implies; whence; it follows.* Thus:

> "If a strict definition of logic were stated at the outset, the student would not comprehend its intention,"

is an inference, by which it is intended to assert that the second part of the statement *follows* from the first. Or, again:

> "The definition of logic just given is exact. Hence the student must not expect to comprehend its full meaning at once."

But the presence of such words as these does not infallibly suggest that the first proposition *implies* the second. Suppose the case:

> "*If* there be any virtue, think on these things."—*Phil.* iv: 8.

This is in the form of an admonition or command, and, since it cannot be said to be either true or false, it is not properly a proposition at all.

It is important, in order to gain precise notions of the meaning of inference, to become aware that a proposition quite false in itself, may yet be truly implied by another. Thus it is untrue that Cæsar is an Athenian and untrue that Cæsar is a Greek, and yet the first proposition *implies* the second:

> If Cæsar is an Athenian,
> then Cæsar is a Greek.

The omission of the statement, "All the Athenians are Greeks," which is understood, if not expressed, a procedure common in ordinary speech, is called **enthymeme.** By this term we intend to signify that our speech is silent on a matter that is tacitly understood.

THE CASE OF FALSE PREMISES

Moreover, it is to be remarked that one or more assertions, untrue in themselves, may yet imply a proposition that is true. If we were to argue:

> Alexander is one of the heroes of the Iliad and all of these heroes died young; therefore, Alexander died in his youth,

our premises, or initial statements, would be false, although our conclusion would be true and the

argument would be formally correct. The fact to be observed in this connection is this: that the conclusion of an argument can only be asserted when the premises are true and the implication formally valid, *except* (as in the case above) when the conclusion is true in independence of the argument. We should then say (that is, in the case last contemplated) that the truth of the conclusion is based on *extralogical* information, that it is true in point of fact and not *because* of the premises.

We may, in this connection, call attention to an error into which uninstructed common sense sometimes falls, through a failure to recognize this distinction. A speaker, we will say, is trying to convince us of the wisdom of some political policy, or, it may be, the truth of some political theory. He begins with premises that we are altogether disinclined to allow; but, as the result of a series of cogent inferences, we find him, toward the end of his discourse, asserting matters that all of us agree to be so. Unconsciously, as we retrace his argument and discover each one of his steps to be validly taken and the outcome of his original statements to be true—unconsciously, I say, we are apt to conclude that there must be some truth in the premises with which he began. But such a conclusion would be in no way justified. The error involved in such a step is known as the fallacy of **asserting the consequent.**

NOTATION FOR CLASSES

We shall, in the chapters which follow, employ the small letters at the beginning of the alphabet, *a, b, c,* etc., to designate groups—Athenians, Greeks, Triangles, etc.—groups the members of which are ordinarily conceived by the aid of some quality or characteristic which they have in common. We shall thus learn to habituate ourselves to such expressions as,

All of the *a's* are *b's*

or, as we shall phrase it more commonly,

All *a* is *b,*

and by this we shall understand it to be asserted that all the members that belong to the *a* class are contained among the members of the *b* class. If *a* and *b* be particularized, so that the assertion becomes,

All metals are elements,

it will be true; whereas, if it were to read,

All metals are compounds,

it will manifestly be untrue.

In the light of this illustration it will be clear that the truth or untruth of assertions similar to this, like,

All *a* is *b*,
some *a* is *b*,
no *a* is *b*,
some *a* is not *b*,

will depend upon what specific meaning is assigned to the symbols *a* and *b*.

TRUTH-VALUES INDEPENDENT OF THE TERMS

But the student will have to habituate himself as well to expressions whose truth or untruth is *independent* of the meaning of *a* or *b*. Suppose that in the first and third expressions listed above, *b* should take on the specific meaning non-*a*, we should then have,

All *a* is non-*a*,
no *a* is non-*a*,

which would become, if we were further to particularize the meaning of *a*,

All Athenians are non-Athenians,
no Athenian is a non-Athenian.

It would be evident that the last of these expressions will be true for all possible values of *a* and

that the first will be untrue in the same way, without any restriction being placed on the meaning of *a*.

Similarly, the first member of our original set implies the second, that is,

If all *a* is *b*,
then some *a* is *b*,

quite in independence of what substantives may be substituted for these symbols. Thus,

If all squares are circles,
then some squares are circles,

and the implication holds even when *a* and *b* stand for **empty classes**—that is, for classes which contain no objects at all, for,

If all square-circles are squares,
then some square-circles are squares.

Another implication of a somewhat more general character than the cases that have just been cited, and whose truth is independent of the meaning of *a*, *b*, and *c*, would be,

If some *b* is not *a*
and all *b* is *c*,
then some *c* is not *a*.

A case of this sort may occasion the student some difficulty when he meets it for the first time, but by continued attention to its sense he will soon be able to assure himself of its general truth. Particularized, it might read:

> If some scholars are not Englishmen
> and all scholars are cultivated,
> then some who are cultivated are not Englishmen.

By these examples we have sought to provide the student with a *preliminary* conception of the abstract nature of inference. To broaden and deepen this conception is a part of the task of the chapters which follow.

THE PROPERTIES OF A RELATIONSHIP

Relationships as well as their objects possess properties, and, since it is often important for the student of pure science to have these in mind, we shall enumerate those that are most characteristic. Incidentally, we shall illustrate further some of the distinctions already set down.

Corresponding to any relationship there will be a set of objects, of which it is meaningful to say that they stand in this relationship to one another. Such a set will be termed a **system.** A relation is said to be **reflexive** when it holds of any one of its

objects and that object itself. Thus, *implication* is reflexive, for,

If x (is true) then x (is true);

and so is *inclusion,* for,

(What is) a is included in (what is) a

and the same holds of numerical equality.

(The number) p equals (the number) p.

But *less than* is not reflexive:

(The number) p is less than p;

nor is *perpendicularity* reflexive, at least in the ordinary geometry:

(The line) m is perpendicular to m.

A relation is said to be **reciprocal** or **symmetrical** when, if it holds of any two of its objects, x and y, it holds also of y and x. Thus, *parallelism* and *perpendicularity* are symmetrical:

If x is parallel to y,
then y is parallel to x;
if x is perpendicular to y,
then y is perpendicular to x.

But, of events in time, *subsequent to* is not symmetrical:

If p is subsequent to q,
then q is subsequent to p;

nor is *to the right of* symmetrical:

If a is to the right of b,
then b is to the right of a.

A relation is said to be **transitive** if, when it holds of x and y and of y and z (three of its objects), it holds also of x and z. Accordingly, *implication* and *inclusion* are transitive, but *is the father of* is not transitive. Consider the assertion:

If p follows q and q follows r, then p follows r, p, q, and r being regarded as three events in time. Obviously, the statement will be verified if the events occur in the order,

$$r\ q\ p.$$

But suppose that they *actually* occur in the order,

$$p\ q\ r.$$

Then all of the *parts* of the original assertion, viz., p follows q, q follows r, and p follows r, are false. It is very important for the student to realize that the assertion *as a whole,* in spite of this fact, holds

true. The first two parts taken together form what is called the **antecedent** of the implication, and the last part is called its **consequent.** It may be remarked in general, that whenever one of the parts of the antecedent becomes false, or whenever the consequent becomes true, then the consequent *follows* in the particular case, whether it follows generally or not. There are six permutations of the three letters *p, q,* and *r.* The student will find it a valuable exercise to verify the *transitivity* of the relation *follow* (in point of time) by taking its objects in each one of their six possible orders.

MEANING OF DEFINITION

We have now made clear what it means for a relationship to possess or not to possess a given property. We remark, further, that it is by its properties that it is defined. Suppose three relationships are given and it is said of the first that it is symmetrical, but neither reflexive nor transitive; of the second that it is transitive, but neither reflexive or symmetrical; and of the third that it is reflexive and transitive, but not symmetrical.

Now, while you cannot say of the first relation precisely what it is—it might be the relation of *spouse* or the relation of *perpendicularity*—you may yet name a good many relations which it is not. For example, it is not *father of,* or *subsequent to,* or *to the right of.* But (and this is the important

thing) its possible meaning is delimited by the conditions imposed upon it. The second might be the relation *greater than* or it might be *subsequent to.* The third might be *implication* or it might be *inclusion.* In each case there will be a great many things which it could not be.

Our meaning will now be clear when we say that a relationship is defined when enough of its properties have been enumerated to distinguish it from whatever other relationships are in question, and that these properties are to be found by constructing all the true and all the false propositions into which this relationship may enter in a meaningful way. The task of any deductive science, then, is to completely develop its own system, for it is precisely within its own system that the propositions in question may be found. A deductive science, therefore, is defined by the task or problem which it sets for itself, and its *full* meaning, accordingly, will only appear when this task has reached completion.

EXERCISES

1. Are the following consequences justly drawn from the stated conditions:

   Upon experiment it is found that a musical note p and a musical note q cannot be distinguished by ear, and that the same holds of q and r. It is inferred that p and r are indistinguishable by ear.

   Two straight lines have no common perpendicular. It is inferred that they approach each other.

A candle is burned in air under a jar, until the oxygen is exhausted. It is inferred that the inert residuum ("nitrogen") is one chemical substance.

A chair and a lead ball of equal weight are held, one in each hand. It is inferred that they will be judged of equal weight.

The pitch of an engine whistle is rising. We infer that the train is approaching.

An ice vender has two weightless scales. He hangs one scale on the other and ten pounds of ice on the lower scale. We infer that each scale will register five pounds.

The number of prime numbers is less than the number of numbers, for not every number is prime.

A thick glass and a thin glass are filled with boiling water by different observers in different rooms. The observer with the thin glass infers that the glass in the other room did not break because his own did not.

2. Examine the following statements in order to determine their truth or untruth:

War is war and Germany is Germany.

"No man can lose what he never had."

A work of art is either moral or immoral.

"Hang sorrow! Care will kill a cat,
And therefore let's be merry."

"O wad some power the giftie gie us
To see oursels as ithers see us!"

It is true that not all prime numbers are odd.

If no proposition is true, then one proposition is true.

If the moon is green cheese, Cæsar and Socrates are the same person.

3. In the following propositions:

All metals are elements,
no elements are compounds,
some metals are red,
not all metals are white,

the relations are: "all, are," "no, are," "some, are," "not all, are." Classify these under the heads, reflexive, symmetrical, and transitive.

CHAPTER II

CLASSIFICATION OF TERMS

The word **term** is from the Latin *terminus* and is so designated because it forms one end of a proposition. For our purposes a term is synonymous with a **class,** a group of objects which have some characteristic in common, every substantive in the language being the symbol for such a group. If a term denotes a perfectly definite group of objects, it is called a **constant** term; if it stands indifferently for any class whatever, it is called **variable.**

THE PREDICABLES

Many are the ways in which terms may be classified, but only those divisions will be noticed which have some bearing on our subsequent theory and its applications. In the first instance, because of the importance of the terminology, we must describe the Aristotelian **predicables.** These are said to be the kinds of terms or attributes which may be predicated of any subject. They are called genus, species, difference, property, and accident. When a class is conceived as divided into a number of smaller classes it is called the **genus,** and each

smaller class that goes to make it up is called a **species** of the genus. Thus, if the genus be the class of numbers, odd numbers and even numbers are two species of the genus; if the genus be odd numbers, all prime numbers, except the number two, will be one of its species. It is important to observe that, while the genus contains more objects or individuals than the species, it is defined by fewer attributes. If the genus be number and the species be prime number, the genus is defined by whatever is characteristic of number, and the species by these same attributes with the addition of whatever is characteristic of a prime.

This double meaning of genus and species is fixed by different names. Thus, the individual things to which the term applies, comprise its meaning in **extension** (extent, breadth, or denotation). The qualities that serve to define the term comprise its meaning in **intension** (intent, depth, or connotation). Ordinarily, if we add qualities to a term—that is, if we increase its meaning in connotation or intension—we thereby diminish its meaning in denotation or extension. Two species of the genus substances would be elements and compounds, the first being gotten by adding the quality "chemically simple," or "not further reducible," to the genus. Again, two species of the genus element would be metals and non-metals. The first would be gotten by adding, it may be,

the characteristics, possessing luster and being an easy conductor of electricity. It is, therefore, usually said: As the connotation of a term is increased the denotation is decreased. The student must be warned, however, that this law only holds when the extension of the genus class is finite. Thus, if there be an infinite number of prime numbers, the denotation of "number" is not diminished by adding that the number is a "prime number."

The additional qualities required to distinguish the species from the genus are called the **difference,** and a class is supposed to be defined by the proximate genus (next higher genus) and the difference. The old manuals of logic, following tradition, speak often of a lowest species (*infima species*), a class not further divisible, and a highest genus (*summum genus, genus generalissimum*), which cannot in turn be taken as the species of a higher class. The modern counterparts of these are the **null class,** or class which contains no objects, such as square-circles or alien Americans, and the so-called **universe** of discourse, which contains all the objects that happen to be in question.

The remaining predicables, property and accident, are thus defined: A **property** is any quality that may be predicated of a class, and which, implicitly or explicitly, is essential to the meaning of the class. An **accident** is any quality which may be predicated of a class, but which is not essential

to the meaning of the class. It would be accidental for an isopod to be red, but essentially it must have equal legs. An odd number has the property of being not divisible by two; it is accidental to its meaning for it to be a prime. Water is essentially composed of hydrogen and oxygen and only by way of accident is it a solid, a liquid, or a gas.

REDUCTION OF TERMS TO THE CONCRETE GENERAL

Terms are, according to another important distinction, either singular or general. A **singular** term denotes an individual. Such names as London, Socrates, the Vatican, or the son of Napoleon I, Kant, or either one of the Kilkenny cats, designate a single object. A **general** term denotes any one of a number of objects. Cabbages and kings, monkeys and prime ministers would be examples of the case in question. In the logic of Peano, whose work has inspired much of the recent research in this subject, the relation of an individual to a class is conceived as different from the relation of a class to a class. What distinguishes the case of the inclusion of one class in another and the case of the inclusion of an individual in a class, is the property of transivity, which is taken to hold of the first relation, but not of the second. If I say, "Athenians are men and men are a class, therefore Athenians are a class," I say something that is not only meaningful, but true. But if I assert, "Soc-

rates is a man and men are a class, therefore Socrates is a class," I am supposed to say something meaningless, or at least something untrue, the conclusion being false and the premises being true.

We shall, however, in our subsequent theory reject this distinction of Peano's making, as one whose nature is extralogical, as one which turns on a question of fact or is a matter of application. That is, we shall say, "Socrates is a man" is exactly expressed by the phrase, "Every Socrates is a man," it being a matter of extralogical information—that is, a matter of fact—that there is only one Socrates. Or, to take a case in which a singular term occurs both as subject and as predicate, the proposition, "St. Paul's is the largest cathedral," is exactly, if awkwardly, expressed by, "Every St. Paul's is every largest cathedral," for it is a geographical fact that there is only one St. Paul's, and it is an arithmetical fact that there is only one largest member of a class. Accordingly, in translating grammatical expressions into the forms which are recognized by the logician, a singular term may always be reduced to a term which is general.

A further division of terms, which it is necessary to recognize, is the distinction between those which are abstract and those which are concrete. All general terms are either concrete or abstract. A **concrete** term is the name of a group of things conceived as individuals. An **abstract** term is the name

of a group of things conceived by the aid of a common property. It will not be necessary to multiply illustrations of this distinction. Truth and beauty are abstract terms; true things and beautiful things are concrete. If I say "Truth is beauty," the same meaning is advanced in the expression, "True things are beautiful things." Observe, then, that just as the singular term may always be reduced to the concrete general, so terms that are abstract may always be made concrete.

In concluding a classification of terms we must notice their division into those that are positive and those that are negative. All general terms are either positive or negative. A **positive** term connotes the possession of a quality. A **negative** term connotes the absence of a quality. The genus substances is made up of two species, elements and non-elements, and of these the first is positive and the second negative. But this distinction is relative, for elements and non-elements may be called, respectively, non-compounds and compounds. Whenever a negative term describes some class important in itself, language has generally invented a positive term to correspond. For the chemist non-elements are as important as elements, so that the word compounds has been invented to stand for that class. There are, however, notable failures to create such a word. The genus elements is divided into metals and non-metals, but there is no corresponding positive term

with which to designate this latter class. In general we observe that is an accident of language, whether or not a negative term possesses a synonyme which expresses its positive sense. Not all terms which have a negative prefix, however, convey a negative intent. Jevons remarks: "The participle *unloosed* certainly appears to be the negative of *loosed;* but the two words mean exactly the same thing, the prefix *un-* not being really the negative; *invaluable,* again, means not what is devoid of value, but what cannot be measured; and a *shameless* action can equally be called by the positive term, a *shameful* action."

UNIVERSE OF DISCOURSE

It is necessary to have very clearly in mind the distinction between a positive term and its corresponding negative, or the distinction between a class and its contrary (contradictory), if we are to understand the meaning of what is called the **universe of discourse,** a conception which now plays a very important rôle in the present-day logical theory. The view that in any argument there is presupposed a limited class, which stands for all of the objects under discussion, is due to De Morgan and we can not do better than to quote this author in full: "Let us take a pair of contrary names, as man and not-man. It is plain that between them they represent everything imaginable or real, in the universe. But

the contraries of common language usually embrace, not the whole universe, but some one general idea. Thus, of men, Briton and alien are contraries: every man must be one of the two; no man can be both. Not-Briton and alien are identical names, and so are not-alien and Briton. The same may be said of integer and fractions among numbers, peer and commoner among subjects of the realm, male and female among animals, and so on. In order to express this, let us say that the whole idea under consideration is the *universe* (meaning merely the whole of which we are considering parts) and let names which have nothing in common, but which between them contain the whole idea under consideration, be called contraries *in or with respect to that universe.* Thus, the universe being mankind, Briton and alien are contraries, as are soldier and civilian, male and female, etc.: the universe being animal, man and brute are contraries, etc."

EXERCISES

1. Give a connotative and give a denotative definition of prime numbers less than ten.
2. Name three species of the following genera, which together make up the whole: animal, plant, number, element.
3. Show how the law which connects the quantity of extension with the quantity of intension holds of the series: gold, metal, element, substance.
4. Are the following characteristics, that are predicated of the planets of our system, properties or accidents?
   There is a "regular progression of distances" of the planets from the sun (expressed as Bode's law). This breaks down at Neptune.

The plane of a planet's rotation practically coincides with that of the orbit of each—probably excepting Uranus.
The direction of rotation is the same as that of the orbital revolution—probably excepting Uranus and Neptune.

5. Does the term property, as used in the statement which follows, conform to the definition of this chapter?
The properties of the elements are periodic functions of the atomic weights;—elements arranged in a series of increasing atomic weights show steady increase or steady decrease in a property within any one period. Exceptions are iodine, tellurium, iron, cobalt, and nickel.
6. What universe of discourse is most naturally suggested by the following terms and their negatives? Odd numbers, straight lines, carbon compounds, protective tariffs, foreign policies.
7. Define the following words in terms of what you take to be the proximate genus and the difference: triangle, mammal, proposition, system, species.
8. Can the following words be termed *indefinables* in the above sense? Class, point, number, time, length.
9. Classify the following words under the heads, singular and general, abstract and concrete, positive and negative: unwieldy, Jupiter, protoplasm, Senate, incognito, respiration.

CHAPTER III

LOGICAL AND GRAMMATICAL FORMS

At the conclusion of our introductory chapter we were at pains to distinguish between statements whose truth or falsity depends upon the meaning of the terms, and those whose truth or untruth is independent of any meaning that our general terms, *a, b, c,* etc., may happen to take on. Statements of the first sort are commonly designated **propositional functions;** those of the second sort, **propositions.** In spite of this distinction we shall employ the word *proposition* to denote any sentence that is either true or false, and the word will now be understood to be defined in this more general sense.

Not all the sentences which the grammarian recognizes are propositions. Thus, the **interrogative,** the **hortatory,** and the **imperative** modes of expression will be sentences, but not propositions in the sense defined. It is neither true nor false to say,

> "What's Hecuba to him or he to Hecuba,
> That he should weep for her?"

Or to say,

> "Eat, drink and be merry."

Or, again,

"Stand not upon the order of your going,
But go at once."

Of any sentence, however, which the grammarian calls **declarative, optative,** or **exclamatory,** either truth or falsehood may be predicated. It is our purpose here to indicate the manner in which any proposition, of whatever grammatical form, may be expressed by means of the few simple forms which the logician recognizes. It is manifest, then, that our analysis need not concern itself with sentences of the interrogative, the hortatory, or the imperative type.

In the first place, we observe that any expression in the optative form may always be made declarative. If one were to say,

"Would that ignorance were bliss,"

he might, presumably, substitute for this, without changing the meaning in any way,

"I wish that ignorance were bliss."

Or, again,

"The devil damn thee black,
Thou cream-faced loon,"

is clearly susceptible to the same modification, it may be at the cost of some rhetorical advantage.

A reduction of the exclamatory to the declarative form is equally possible. Thus,

"A Daniel come to judgment!"

means, we may presume,

"Another Daniel's come to judgment,"

Or, again, the exclamation,

"How sharper than a serpent's tooth it is
To have a thankless child!"

may easily be made direct assertion. We may, therefore, confine our attention to declarative sentences alone.

In effecting a further reduction of grammatical forms, in order to show that the forms employed by the logician are sufficient for the expression of any truth, we observe that any verb other than the verb "to be" may be rendered by the copula, by absorbing its meaning into the predicate term. The expression "it rains" has always reference to some particular place as,

"It is raining in London,"

and this in turn is equivalent to

"London is a place where rain is falling."

If it be remarked that,

"A favorite has no friend,"

the same intention is expressed by,

"Every favorite is friendless."

The distinction of *number* offers, in turn, no real difficulty. The proposition,

"All the Athenians are Greeks,"

may be written in the equivalent form,

"Every Athenian is a Greek."

Moreover, the word "all" need not be replaced by "every," for we may say, at the cost of some awkwardness:

> "All the members of the class Athenians is a member of the class Greeks."

Further, differences of *tense* are easily reduced to the *present* by attaching a date, or the suggestion of a date, to the predicate term. Thus, in place of,

> "Achilles was celebrated as the swift of foot," it may be stated that,
>
> "Achilles is celebrated in the 'Iliad' as the swift of foot."

The student will have no difficulty in effecting a reduction of other grammatical distinctions, such as those of *person, voice,* and *mood.* Assuming, then, that these reductions have been made, it will be taken for granted that any proposition, of whatever grammatical structure, may be cast into one or more of the relational functions that belong to the domain of which logic treats.

LOGICAL AND GRAMMATICAL FORMS

FORMS RECOGNIZED BY THE LOGICIAN

The logician recognizes the following propositions as necessary and sufficient for the expression of any truth:

(1) The **disjunctive** form (either, or),
either x or y,

(2) The **conjunctive** form (and),
x and y,

(3) The **hypothetical** form (if, then),
x implies y,

(4) The **categorical** forms (adjective of quantity copula),

A (ab)	All a is b,
E (ab)	No a is b,
I (ab)	Some a is b,
O (ab)	Some a is not b.

THE DOUBLE MEANING OF DISJUNCTION

The disjunction, *either, or,* in ordinary speech is ambiguous. If we were to say of such and such a person,

> "This man is either an Englishman or a Shakespearean scholar,"

we may not intend to exclude the possibility of his being both, educated Englishmen being supposed, we will say, to know the plays well, while the same assumption is not made of men of other nationalities. But if we were to say,

> "I know that I shall either like this man or dislike him very much,"

the intention is clearly to exclude the possibility of my liking him for some of his qualities and disliking him for others.

Here, however, the disjunction is not one between classes, as in our first illustration, but one between propositions, as in our second example. Commonly, when the options of every-day life are expressed in the form of a disjunction, when they are what William James calls options of the living, forced or momentous kind, we intend the sense: either the one or the other, *but not both.* Thus to transform some of James's illustrations,

> "This man is either Christian or he is agnostic," or
> "You must either accept this truth or go without it,"

the two parts of the disjunction *cannot both be true.*

If, on the other hand, I should meet a man whose knowledge of Shakespeare is extraordinary and should exclaim in surprise,

> "Either this man is an Englishman or else he is a Shakespearean specialist,"

I mean at least *one* of the parts of the disjunction to be true, and *possibly both.* The student should always bear in mind that this last case conveys the

true meaning of *logical* disjunction and that disjunction will always be understood in this sense.

Whenever the letters x, y, etc., are used to designate propositions, they are commonly taken to be true; that is, the words, *is true,* are understood to follow each one. Thus, if we assert,

either x or y,

we are only shortening the expression,

either x is true or y is true, or both,

and the shorter phrase,

x and y

means in expanded form,

x is true and y is true.

Whenever the proposition x or the proposition y is taken to be false ,the words, *is untrue,* will have to be expressly written down.

LAW CONNECTING CONJUNCTION AND DISJUNCTION

It will always be possible to express the denial of a disjunction—that is, the assertion that the whole statement, either x or y, is untrue, in the form of a conjunction of the two propositions involved. Thus, the untruth of

either x is true or y is true

is exactly rendered by

x is untrue and y is untrue.

This is an important fact and is one of the reasons for taking logical disjunction in the sense above defined. If we deny of some person "that he is either foreign born or that he is foreign bred," we assert the same thing when we say:

> "That he is foreign born is untrue and it is untrue that he is foreign bred."

In the same way the denial of the conjunction of two propositions may always be expressed as a logical disjunction. Thus the untruth of

x is true and y is true

is precisely equivalent to

either x is untrue or y is untrue.

If we deny "that this student is dull and that he needs no stimulus," we express the same thing by saying,

> Either this student is not dull or else he needs a stimulus.

This law which connects the conjunctive and the disjunctive forms may be expressed generally as follows: the denial of the disjunction of two propositions is the conjunction of the two separately

denied; the denial of the conjunction of two propositions is the disjunction of the two separately denied.

LAW CONNECTING DISJUNCTION AND IMPLICATION

There is another fact, which is universally assumed in modern logical investigations and to which it is right to direct the student's attention. This is a certain equivalence, which is assumed to exist between the hypothetical and the disjunctive forms. The assertions,

> "If he speaks not in jest, then
> he speaks in earnest," and
> "Either he speaks in jest or in earnest,"

are taken to convey precisely the same meaning. A general statement of this truth would be: x implies y is equivalent to the phrase, either x is untrue or y is true. In the subsequent chapters we shall express the *denial* of "x implies y" by means of the expression, "x does not imply y."

THE CATEGORICAL FORMS AND THEIR DIAGRAMMATICAL REPRESENTATION

It only remains to explain the categorical forms and the notation which has been introduced to represent them. In the propositions, A(ab), E(ab),

I(*ab*), and O(*ab*), the terms are the **subject** *a,* which is written first in the bracket, and the **predicate** *b,* which is written second, and the **term-order** is the order subject-predicate. When we wish to indicate that the term-order is not settled, we shall place a comma in the bracket between the terms. Thus, A(*a, b*) may mean either "all *a* is *b*" or "all *b* is *a.*"

"All *a* is *b*" asserts that all the members of the *a* class are contained among the members of the *b* class, leaving it undetermined whether the members of the subject class are related to the members of the predicate class through identity, or exhaust only a part of the members of that class. Accordingly, the word *some,* in the sense of *some at least, possibly all,* is understood, if not expressed, before the predicate term, and it is this sense which the word will always convey in our subsequent theory. The meaning of the assertion, "all *a* is *b,*" may be illustrated by the following diagram (Fig. 1), that is, if "all *a* is *b*" is a true proposition, then the class *a* is related to the class *b* in one of these two ways,

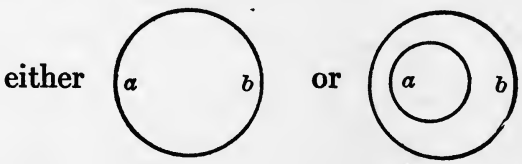


FIG. 1

The diagrammatic representation of the other categorical forms is given (in Figs. 2, 3, 4) below:

No *a* is *b*

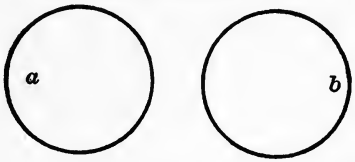
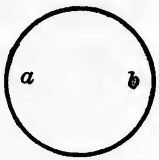


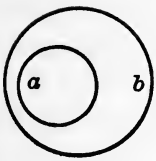
FIG. 2

Some *a* is *b*

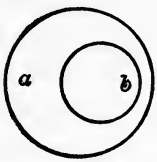
either



or



or



or

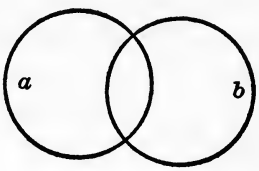
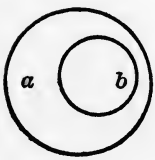


FIG. 3

Some *a* is not *b*

either



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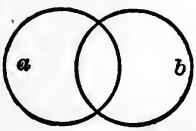


or

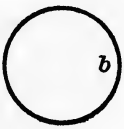


FIG. 4

These propositions are the ones employed in the classical logic, the science which has descended to us from Aristotle. The peculiar simplicity which is introduced into logic by the selection of this particular set of categorical forms depends upon the fact that the denial of any one involves the assertion of one of the others. Thus the denial of A is the assertion of O, and conversely; the denial of E is the assertion of I, and conversely.

EXERCISES

1. Are the following sentences propositions, and why?

> "Can it be possible that this old hermit has heard nothing of the report that God is dead!"
> —NIETZSCHE, *Thus spake Zarathustra.*

> "Necessity knows no law. . . . Behold the eleventh commandment, the message you bring to the world to-day, sons of Kant!"
> —ROLLAND, *Au-dessus de la mêlée.*

> "Render to Cæsar the things that are Cæsar's, and to God the things that are God's."
> —*Mark,* xii: 17.

2. Render the sense of the following sentence in the form of a conjunction:

> "The race is not to the swift, nor the battle to the strong."
> —*Ecclesiastes,* ix: 11.

and the sense of the following sentence in the form of a disjunction:

"Of making many books there is no end; and much study is a weariness of the flesh."

—*Ecclesiastes*, xii: 12.

3. Express the following disjunction in the hypothetical form:

"Either Bacon and Shakespeare are not the same person or else the moon is made of green cheese,"

and the following implication in the form of a disjunction:

"If you do not accept this truth, you must go without it."

4. Express the following sentences in categorical form:

"The heart hath its own reasons, which are unknown to reason."

—PASCAL.

"A nation free from prejudice soon becomes a free nation."

—CONDORCET.

"The brain in some sort digests impressions; it produces an organic secretion of thought."

—CABANIS.

5. The word *true* means true in all instances. Distinguish between the meaning of the phrase, *not necessarily true*, and the phrase, *necessarily not true*, and state general propositions which illustrate each meaning.

FALLACIES

CHAPTER IV

HISTORICAL CHANGES IN MEANING

Since ambiguity in the meaning of a word or phrase is perhaps the most fertile source of error, when we come to apply the rules of correct thinking, it is important for the student to be aware of some of the ways in which these ambiguities arise. **Semasiology,** whose problem it is to set forth the causes of these changes in meaning, is a field as yet but imperfectly explored. We shall be content to enumerate a few of the commonest cases in which old signs tend to disappear, and new ones arise to replace them.[1]

We note in the first instance that two *synonymes which are exact tend to differentiate in meaning.* De Quincey observes: "all languages tend to clear themselves of synonymes, as intellectual culture advances; the superfluous words being taken up and appropriated by new shades and combinations of thought evolved in the progress of society. And long before this appropriation is fixed and petrified, as it were, into the acknowledged vocabu-

[1] Some of the examples in this chapter are borrowed from Jevons, but by far the larger number are taken from Bréal, *Essai de Sémantique,* Paris, 1897.

lary of the language, an insensible *clinamen* (to borrow a Lucretian word) prepares the way for it. Thus, for instance, before Mr. Wordsworth had unveiled the great philosophic distinction between the powers of *fancy* and *imagination,* the two words had begun to diverge from each other, the first being used to express a faculty somewhat capricious and exempted from law, the other to express a faculty more self-determined.

When, therefore, it was at length perceived that under an apparent unity of meaning there lurked a real dualism, and for philosophic purposes it was necessary that this distinction should have its appropriate expression, this necessity was met half way by the *clinamen* which had already affected the popular usage of the words."

In Brittany, says the Abbé Rousselot, gardens were formerly called *courtils.* The rustic word which is now displaced as the usual term, is still used in a contemptuous sense. Similarly, with the introduction of the word *hotel,* the German *Wirtshaus, Wirtschaft,* has come to designate an inn of the less pretentious type. Again, to take an illustration from the philosophical dictionary, the Greek ἀρχαί (principles) and στοιχεῖα (elements) were certainly synonymous in the time of Thales, at least in the sense in which they were used by him. But this philosopher was severely reproached by Plato for not having distinguished between them.

LAW OF GENERALIZATION

Again, *words of special signification may take on a more general sense.* English *gain,* which has been influenced by the French *gagner* (to pasture), *le gagneur* (the cultivator), *le gain* (the harvest), means now, in either language, profit of any sort. Latin *pecunia,* originally wealth in live stock, came in the end to designate riches of whatever kind. French *temps* (time) meant at first heat (temperature), and afterward the weather, until finally the abstract idea of duration came to be attached to it. The Greek word χαραχτήρ denoted an engraving tool, but it soon came to be applied to the letters or signs engraved, a sense still preserved when we speak of the Greek characters. It was then extended by a sort of metaphor to whatever is regarded as the essential sign of any object whatever. The word *prince* has a sense much less special than the source from which it came, the *princeps senatus.*

Even proper names in certain instances may become generalized. Thus, in Rome *Cæsar* soon came to designate the emperor, and its modern derivative, czar, has even produced the abstract term, czarism. An adjective *Fabian* has been formed from the name of the Roman general Quintus Fabius Maximus, and any policy of procrastination or delay which postpones a decision is characterized as Fabian. The tower built on the island

of Pharos near Alexandria has produced in several languages the name "Pharos" as a synonyme for lighthouse. Again, while there was in the beginning but one sun and one moon, we now speak of the fixed stars as *suns* and we refer to the satellites of Jupiter as the *moons* of Jupiter.

LAW OF SPECIALIZATION

A tendency which is precisely the opposite of the one that has just been recorded is constantly taking place in the formation of a language. *Words of a general signification may take on a special or more restricted meaning.* Thus, in the Middle Ages the word *species* employed by the purveyors of drugs to designate the kinds of ingredients which they sold (saffron, clove, cinnamon, nutmeg) became, when it again entered the colloquial language, the French *épices,* English *spice.* German *Muth* (courage) originally of a more general signification, which is preserved in the derivatives *Hochmuth* (pride), *Grossmuth* (generosity) etc., and roughly rendered by English *mood,* probably derived its special meaning from words like *Rittersmuth, Mannesmuth,* etc. English *wit,* while tending to become specialized, still preserves its archaic sense of "shrewdness" or "intelligence" in the phrase *mother wit.* Many other examples might be given. *Urbs,* the name of Rome for the country folk of Latium, became, because of the Roman legions, the

name familiar to the whole of the ancient world. *Physician,* from φύσις (nature), has become so far specialized that a new word, *physicist,* had to be invented to express the original meaning. This word in turn has shown the same tendency, and there is now no commonly accepted term by which may be designated a scientist, whose interest is primarily in nature—*i.e.,* in nature as contrasted with man. The word *pope* (Latin *papa*) may have originated as a term of endearment (little father), employed, perhaps, in much the way in which the French now speak of Papa Joffre.

The following remarks of De Morgan deserve to be quoted in full: "The word *publication* has gradually changed its meaning, except in the courts of law. It stood for *communication to others,* without reference to the mode of communication or the number of recipients. Gradually, as printing became the easiest and most usual mode of publication, and consequently the one most frequently resorted to, the word acquired its modern meaning; if we say a man publishes his travels, we mean that he writes and prints a book descriptive of them. I suspect that many persons have come within the danger of the law, by not knowing that to write a letter which contains defamation, and to send it to another person to read, is *publishing a libel;* that is, by imagining that they were safe from the consequences of publishing, as long as they did not

print. In the same manner, the well-established rule that the first publisher of a discovery is to be held the discoverer, unless the contrary can be proved, is misunderstood by many, who put the word printer in the place of publisher. I could almost fancy that some persons think rules ought to travel in meaning, with the words in which they are expressed."

Sometimes an abstract word may become the name of an object. The Latin *vestis* (the act of clothing oneself) became in course of time the name of a particular garment. The Latin ending *-tas* (as in *dignitas, cupiditas*) served to form a substantive expressing a quality. But *civitas,* which meant at first the quality of being a citizen, came to designate the totality of citizens and finally stood for "the city" itself. German *Kind* came in course of time to mean "infant," though originally it referred to "the race."

TRANSFER OF MEANING BY ANALOGY

Besides the two processes described above as **generalization** and **specialization,** the senses in which a word may be employed may be merely *multiplied.* This transpires most commonly by the transfer of meaning through the use of **analogy** or **metaphor.** Thus, in Latin "intelligence" is like a point which penetrates (*acumen*), while "folly" resembles a blunt knife (*hebes*). At Rome there took place,

every five years, a census accompanied by a religious ceremony called "purification" (*lustrum, lustratio*). Since on this occasion the magistrates and the priests walked among the crowds, the verb *lustrare* came to mean "to pass in review." Cicero expressed astonishment that the Roman peasants should have given the name pearl (*gemma*) to the buds of trees. Actually the change by metaphor had been in the opposite sense, for pearls were so named because of their resemblance to buds about to burst. Again, *rivalis* designated neighbors on the opposite sides of a stream or who used the same water supply, but came to designate later on any sort of rivalry whatever. The word *influence* goes back to ancient astrological superstitions; it was supposed that a certain fluid escaped from the stars to predetermine the destiny of men and events.

Some of Archbishop Whately's examples of the transfer of meaning by analogy are worth recording. He says: "A blade, of grass, or of a sword, have the same name from direct resemblance between the things themselves. But instances of this kind are far less common than those in which the same name is applied to two things, not from their being *themselves* similar, but from their having *similar relations* to certain other things. And this is what is called analogy. Thus, the sweetness of a sound and of a taste can have no *resemblance:* but the word is applied to both, by *analogy,* be-

cause as a sweet taste *gratifies* the palate, so does a sweet sound, the ear. Thus, we speak in the analogical sense of the hands of a clock, the legs of a table, the foot of a mountain, the mouth of a river, . . . from the *similar relations* in which they stand to other things, respectively, in reference to use, position, action, etc.

"The words pertaining to *mind* may in general be traced up, as borrowed (which no doubt they all were, originally) by analogy, from those pertaining to *matter:* though in many cases the primary sense has become obsolete. Thus 'edify' in its primary sense of 'build up' is used, and the origin of it often forgotten; although the substantive 'edifice' remains in common use in a corresponding sense. When, however, we speak of 'weighing' the reasons on both sides—of 'seeing' or 'feeling' the force of an argument—'imprinting' anything on the memory, etc., we are aware of these words being used analogically."

EXERCISES[1]

1. How would you explain the fact that the first two words in the following lists are Saxon and the last two Norman?

(a) home, hearth; palace, castle.
(b) boor, churl; duke, count.
(c) ox, deer; beef, venison.

2. How did *miscreant* (misbeliever) acquire its present sense?

[1] These examples have been taken from Trench, *On the Study of Words.*

3. How could *dunce* have been derived from Duns Scotus, the "subtle doctor," the great teacher of the Franciscan order?
4. As the result of a false science, *crystals* were so named because of their resemblance to ice, which was then supposed to have "lost its fluidity." Explain the words: jovial, saturnine, mercurial, disastrous, ill-starred.
5. According to an ancient theory of medicine, the disposition of mind and body depends upon a proper proportion of four principal moistures (humors). Explain: good humor, bad humor, dry humor.
6. Occasionally a name will embody some original error. Explain the words: America, Turkey, dinde (French), gypsies.
7. On being asked of what city he was, Diogenes replied that he was a cosmopolite. How must this reply have sounded to Greek ears?
8. By which one of the causes enumerated in this chapter would you explain the change in the following words from their primary to their secondary meaning: caprice, halcyon, voluble, temper, spirit, prude, loyalty, journal, minion, knave, roué?
9. What facts may be inferred from the history of the words: thrall, paper, stipulation, expend, calculate?

CHAPTER V

SEMI-LOGICAL AND MATERIAL FALLACIES

The term **fallacy** in the narrow or technical sense is used to designate some breach of the rules of correct inference; in the broader, more popular sense it denotes any one of the numberless ways in which men may fall into error. **Sophism, paradox,** and **paralogism** are inexact synonymes of this word and have a great variety of meaning. Thus paradoxical may be applied to an argument, which merely appears to be an offense against logic, or to a point of view which seems to offend common sense, or which only is beyond common apprehension. A sophism denotes ordinarily an argument which deceives not the author of it, but his opponent only, or which places the burden of the proof upon the latter. A paralogism may mean a special tendency of the mind to adopt an error of a particular kind, and in this sense it is employed by the German philosopher Kant. Fallacies commonly hinge upon an ambiguity in the meaning of terms or relationships. Thus it may appear *paradoxical* that this word and its synonymes should exhibit on their own part such a wide range of ambiguity.

PARADOX REMOVED BY EXTENDING THE MEANING OF TERMS OR RELATIONSHIPS

It is well known to the mathematician that he has often to extend the sense of his terms or of his symbols of relationship in order to take account of cases not suspected, when his definitions were set down. Thus, the primitive sense attaching to quantity will not permit of the interpretation of imaginaries. This, one of the prime difficulties which the beginner in algebra has to overcome, depends upon his instinctively holding to the *original* meaning of quantity, while striving to grasp the *new*. Many of the paralogisms of the older logicians depend upon their inability to generalize their conceptions, when they have met with special cases that resist interpretation. One would like, for example, to be able to say: If a is a class and b is a class, then what is a and b is a class, and what is either a or b is a class. But this will involve the conception of a class that has no members, and such a class has *peculiar* (*i.e., paradoxical*) properties. Thus the members of the class squares and the members of the class circles have no members in common and these latter are contained in and are also excluded from the members of any other class whatsoever. The corresponding notion of a proposition, that is true under no circumstances, is one with which the older logicians could not deal, and hence

for them paradoxical, although it is habitual and conscious in popular usage and is, therefore, recognized by common sense;

> "I will not be afraid of death and bane
> Till Birnam forest come to Dunsinane"

means: "I will not be afraid till what must forever remain untrue comes true; till an impossibility is possible; an emphatic way of saying, 'without qualification, I will not be afraid.' " Again:

> "Nay, had I power, I should
> Pour the sweet milk of concord into hell,
> Uproar the universal peace, confound
> All unity on earth,"

the meaning being, in part: if the consequent be false (I *shall* pour, etc.), then so is the antecedent false (I *have* the power), for an asserted implication is taken to be true. This sense is here rendered unambiguous by the use of the conditional.

EQUIVOCATION AND AMPHIBOLOGY

Many fallacies that arise because of the ambiguity of terms, and which are listed in the manuals of logic, are not intended seriously. Such are jests or puns. A famous case of punning is found in the conversation of Hamlet with the gravedigger:

Ham.—Whose grave's this, sirrah?
Clo.—Mine, sir.
Ham.—I think it be thine indeed, for thou liest in't.
Clo.—You lie out on't, sir, and therefore 'tis not yours: for my part, I do not lie in't, and yet it is mine.

Franklin's well-known remark (on the occasion, I imagine it was, of the signers attaching their names to the Declaration) might or might not be taken seriously, except for its logic, "If we do not hang together, gentlemen, we may expect, each one of us, to hang separately." There are cases in which one cannot be quite sure whether an ambiguity is intended or not. Suppose, for example, the assertion: "Shakespeare did not create the plays. They were conceived by another of the same name." If Mark Twain be the author of this saying, it is at once clear that an ambiguity is intended, but another author may intend to say that Bacon published them under an assumed name. A fallacy which depends upon the ambiguity of a single word is commonly called **equivocation;** if it consists in the ambiguity of a sentence or phrase, it is termed **amphibology.** As an illustration of the fallacy of equivocation consider the following argument for a protective tariff: "When we buy in a foreign country, we get the goods and they get the money, and

when we sell in a foreign country, they get the goods and we get the money. How much better, then, to buy and sell in our own country, for in that case we retain both the goods and the money." The following would constitute an equally good (*and* an equally bad) retort: "When we buy in our own country, the producer loses the goods and the consumer loses the money. But the consumers and the producers make up the entire community. Therefore, when we buy in our own country, we lose both the goods and the money."

An historical dispute as to whether logic is a science or an art depends, probably, upon an ambiguity in the original meaning of the word. Logic is from a Greek word, λογική, an adjective with some substantive understood, which in turn is derived from λόγος. This word possessed a twofold sense, denoting both man's thought and his expression of it, a distinction exactly rendered by the two Latin words, *ratio* and *oratio*. The same equivocation was carried by the derivative λογική, and hence arose, no doubt, the dispute as to whether logic deals with the laws of thought or with the laws of the expression of thought.

FALLACY OF ACCENT

Whenever the sense of an assertion is changed, because the emphasis is thrown on some particular word, the **fallacy of accent** occurs. A certain bar-

ber is supposed to have invited patronage by placing before his shop a sign which contained the following (unpunctuated) statement:

"What do you think
I'll shave you for nothing
And give you a drink"

The visitor, once shaved and having demanded his drink, would be taken outside before the sign, which the barber would then read:

"What! do you think
I'll shave you for nothing
And give you a drink?"

Another instance, which has even led to sectarian controversy, is the meaning of the phrase, "Drink ye all of it." Shall we say, "Drink ye *all* of it," or rather, "Drink ye all *of* it"?

FALLACY OF MANY QUESTIONS

To the fallacy of **many questions** are usually referred all cases in which too many meanings are contained, or in which the issue on that account is generally confused. A good example is the conversation in Hamlet between the gravediggers. Here the first remark is not in the form of a question, but calls, none the less, for a reply. The fallacy might be termed equally well

the fallacy of **many statements.** The example will illustrate, too, what is called in logic a case of **non sequitur.**

> *First Clo.*—If the man go to this water and drown himself, it is, will he, nill he, he goes; mark you that; but if the water come to him and drown him, he drowns not himself: argal, he, that is not guilty of his own death, shortens not his own life.
> *Second Clo.*—Will you ha' the truth on't? If this had not been a gentlewoman, she should have been buried out of Christian burial.

Other fallacies are committed without the intention that they be taken seriously. Polonius conveys a sly hint to Hamlet when he says:

> "If you call me Jeptha, my lord,
> I have a daughter that I love passing well";

and Hamlet as slyly escapes by pretending that the remark contains a formal fallacy, for he rejoins:

> "Nay, that follows not."

Nothing brings a conversation more abruptly to an end or more quickly disarms an opponent than the habit of taking him literally, for, arguing as it does a lack of imagination and even a lack of intel-

lect, he is at once aware that the discussion cannot be maintained on the projected level. Nor does this habit characterize the unlettered only. Many an excellent scholar will betray the essential poverty of his mind by traits which point the same moral, by his attachment to words rather than meanings, or by his scorn of a style that is elegant because elevated, or, again, let us say, by his liking for what he calls the *impersonal* (*i.e.* literal) narration of history. De Morgan remarks that "the genius of uncultivated nations leads them to place undue force in the verbal meaning of engagements and admissions, independently of the understanding with which they are made. Jacob kept the blessing which he obtained by a trick, though it was intended for Esau; Lycurgus seems to have fairly bound the Spartans to follow his laws till he returned, though he only intimated a short absence, and made it eternal."

FALLACY OF ACCIDENT

The same writer recounts the following tale from Boccaccio, a tale in which the man appears to have possessed more of *esprit* than his master, but who could hardly have expected to be taken too literally: "A servant who was roasting a stork for his master was prevailed upon by his sweetheart to cut off a leg for her to eat. When the bird came upon table, the master desired to know what had

become of the other leg. The man answered that storks had never more than one leg. The master, very angry, but determined to strike his servant dumb before he punished him, took him next day into the fields where they saw storks, standing each on one leg, as storks do. The servant turned triumphantly to his master; on which the latter shouted, and the birds put down their other legs and flew away. 'Ah, sir,' said the servant, 'you did not shout to the stork at dinner yesterday; if you had done so, he would have shown his other leg, too.' " The servant was here guilty of what logicians call the **fallacia accidentis,** of predicating of roasted storks what can only be predicated generally of storks. But the fallacy of accident may easily involve us in serious difficulties. The illustration below, taken from De Morgan, deserves to be quoted in full:

"The law in criminal cases demands a degree of accuracy in the statement of the *secundum quid* which many people think is absurd. . . . Take two instances as follows: Some years ago, a man was tried for stealing a ham, and was acquitted upon the ground that what was proved against him was that he had stolen a portion of a ham. Very recently, a man was convicted of perjury, "in the year 1846," and an objection (which the judge thought of importance enough to reserve) was taken, on the ground that it ought to have been

"in the year *of our Lord* 1846." . . . In the two instances, which by many will be held equally absurd, a great difference will be seen by anyone who will imagine the two descriptions, in each case, to be put before two different persons. One is told that a man has stolen a ham; another that he has stolen a part of a ham. The first will think he has robbed a provision warehouse, and is a deliberate thief; the second may suppose that he has pilfered from a cook shop, possibly from hunger. As things stand, the two descriptions may suggest different amounts of criminality, and different motives. But put the second pair of descriptions in the same way. One person is told that a man perjured himself in the year 1846; and another, that he perjured himself in the year of our Lord 1846. As things stand, there is no imaginable difference; for there is only one era from which we reckon."

CONSCIOUS AMBIGUITIES

There is another large and important class of fallacies rather neglected, I think, by the logicians; arguments, which are not to be taken literally, but for a reason very different from the one that applies to the illustrations enumerated above. These are statements which are formally correct, but in which an ambiguity of terminology is *intended,* it may be for rhetorical purposes. Even the unlettered will not take you literally, if you remark that

"business is business." The formal correctness of the phrase tends to force its acceptance, but it is quite evident that more is meant than meets the ear. Again, if I assert that "man is a vertical animal," it will be clear that more than a mere tautology is meant. It is said of Lincoln, while making a tour of the trenches after a brisk fight, that he remarked, with evident disgust of the whole affair (I quote from memory), "Anyone who likes this sort of thing must enjoy it very much." If it be said that "a man is a man for all that," it is to call attention to the fact that a tautology is not always true; that rather "a man is not himself *sometimes.*" When the king and the others have left the play and Hamlet is left alone with Horatio, he says:

> "For if the king like not the comedy,
> Why then, belike, he likes it not, perdy,"

meaning that the burden of a bad conscience is the king's and not his.

Professor Stratton in an article appearing in the *Atlantic Monthly* says: "It is a prevailing belief that the mind is a convenient name for countless special operations or functions" and that these are independent. "When you have trained one of these you have trained that limited function and none other. What you do to the mind by way of education knows its place; it never spreads. *You train*

what you train." Here the formal correctness of the tautology seems to reinforce the argument. But this view of the character of mind ignores many important facts. "The psychological experiments which have so troubled the waters of education prove that normally *you train what you do not train.*" And, again, the conscious fallacy, the deliberate offense against logic, is correctly employed in favor of the opposite view.

In those verses of Lewis Carroll, which he calls "The Three Voices," the man in the piece, who has been accused by the lady of giving himself over to the exclusive instincts of his gourmandizing self, urges in his own defense that

"Dinner is dinner, tea is tea."

His defense is undermined, however, by her resolve to take his statement only at its face value, for she replies:

"Yet, wherefore cease, let thy
scant knowledge find increase;
say men are men, and geese are geese."

Here the intent is not only to overthrow the opponent's argument, to render his contention impotent by refusing his implied ambiguity; but also to make a joke at the erpense of logic itself, which is thus charged with giving us in its implications no information that we did not have before.

IGNORATIO ELENCHI

Again, an opponent may be disarmed for the moment by a statement that, while true, is irrelevant; what is called in logic the **ignoratio elenchi.** Thus Hamlet avoids telling his secret to Horatio and Marcellus by a reply that, to them at least, seems to have no bearing on the case. He says:

> "There's ne'er a villain dwelling in all
> Denmark
> But he's an arrant knave,"

and Horatio replies, quite properly:

> "There needs no ghost, my lord, come from
> the grave,
> To tell us this";

but Hamlet escapes again by simple agreement with this statement in its literal sense and by refusing to seek its implications. He rejoins:

> "Why, right; you are in the right;
> And so, without more circumstance at all,
> I hold it fit, that we shake hands, and part."

Agreement on the part of disputants is the end of discussion. It is said of the Frenchman Fontenelle, that he so far detested all forms of argument that he would refuse to differ with his opponent, em-

ploying habitually the phrase, *tout est possible,* whenever debate threatened. Another case in which an admission by an opponent may be taken unfairly, or, it may be, ironically, so that argument is effectually ended, is cited by De Morgan. "A writer disclaims attempting a certain task as above his powers, or doubts about deciding a proposition as beyond his knowledge. A self-sufficient opponent is very effective in assuring him that his diffidence is highly commendable, and fully justified in the circumstances."

AMBIGUITIES OF COMMON WORDS

Some of the ambiguities to which very common words are liable give rise to misunderstandings that are sometimes serious. Such words as the adjectives of quantity, *all* and *some,* the definite article, *the,* and the copula, *is,* come under this head. The assertions, "all of the angles of a triangle equal two right angles" and "all of the angles of a triangle are less than two right angles," are both true, if *all* is taken collectively in the first instance and distributively in the second. The phrases, "all of these twelve men are a jury" and "all of these men are liable to be prosecuted" illustrate the same ambiguity. In Rousseau's conception of the social contract it is said that each member of society is called upon to surrender *all* his rights in order that the rights of *all* may be preserved—a result that may

appear paradoxical at first blush, until the equivocation in the use of the italicized word is noticed. In the phrase,

Chacun se donnant a tous ne se donne a personne,

the meaning is quite clear and unambiguous. The Latin *omnis* preserves the same double meaning. Thus the state of savage man is described as the *bellum omnium contra omnes.* The word, *both,* is similarly equivocal. If I say, "Both this man and his wife are either male or female," the case is true in the distributive but untrue in the collective sense of *both;* and the opposite will hold if I say, "This man can walk on both legs." But, "A man can hop on both legs" is true in either sense.

One of the chief difficulties of the logic of Hamilton depends on the ambiguity of the meaning of *some.* Of this word he says: "A remarkable uncertainty prevails in regard to the meaning of particularity and its signs. Here *some* may mean *some only—some, not all,"* and is "definite in so far as it excludes omnitude." Thus, "Some Greeks are Athenians." "On the other hand, *some* may mean *some at least—some, perhaps all."* Thus, "Some men are rational animals" where man is defined as a rational animal. If it be argued that "Socrates is a man and man is a class, therefore Socrates is a class," there are those who will find here an am-

biguity in the meaning of the copula or else in the meaning of the singular term. ither Socrates is regarded as a class of one member, they will say, or the relation of an individual to a class is to be distinguished from the relation of a class to a class. The definite article in English sometimes generalizes and sometimes individualizes. "The animal" is general when we speak of the "the animal in man," but otherwise when we say, "Have no fear, the animal will find his way home." Generally it is remarked, *"Man is unfaithful,"* but, *"The dog* is faithful to man." In Greek, in French, in German, on the contrary, the definite article is required before *man,* when the word is intended in the universal sense.

PETITIO PRINCIPII

It is generally true, and is, indeed, set down as one of the axioms of logic, that, if two propositions are true together, then either one of them may be assumed separately to be true. The statement will perhaps appear trivial, but a serious fallacy frequently arises in connection with it, and in the following way: Suppose that, in order to prove a given proposition, we should assume two others, such that one or both of the two assumed ones should be merely a disguised expression of the given one. If we should suppress the premises and assert the conclusion by itself, we should

then virtually assume the conclusion—that is, by assuming the right to suppress the premise equivalent to it. Such a fallacy is known as a **petitio principii.**

Serious instances of this fallacy are not uncommon in the history of science. Thus, most of the apparently successful efforts to demonstrate the so-called parallel axiom of Euclid are breaches of this rule. The demonstrator commonly takes for granted, intuitively, some principle which is equivalent to the result he seeks. The great geometer Gauss, writing on his efforts to effect this proof to his friend Wolfgang von Bolyai in the year 1799, says: "Certainly I have come upon much that for the majority would pass as a proof, but in my eyes demonstrates nothing." He then goes on to enunciate equivalent propositions that would be covertly taken for granted by many, but whose assumption would constitute a *petitio principii.* If the student will realize that for two thousand years mathematicians had struggled with this proof, the same fallacy being committed again and again, he will appreciate the seriousness of the difficulty. De Morgan relates that the mathematician Lagrange once wrote a memoir on the theory of parallels. While presenting it to the members of the French Academy, he withdrew the manuscript in the middle of the reading with the remark, *"Il faut que j'y songe encore."*

ACHILLES AND THE TORTOISE

In concluding this chapter on fallacies we shall include the case of a famous sophism which Zeno the Eleatic employed, in order to prove that motion is impossible. It is known as the paradox of Achilles and the tortoise. De Quincey gives the following account in one of his essays, and, as it cannot be better related, we shall quote him in full:

"Achilles, most of us know, is celebrated in the 'Iliad' as the swift-footed (ποδας ωκυς Αχιλλευς); and the tortoise, perhaps all of us know, is equally celebrated among naturalists as the slow-footed. In any race, therefore, between such parties, according to the equities of Newmarket and Doncaster, where artificial compensations as to the weight of riders are used to redress those natural advantages that would else be unfair, Achilles must grant to the tortoise the benefit of starting first. But if he does *that,* says the Greek sophist, then I, the sophist, back the tortoise to any amount, engaging that the goddess-born hero shall never come up with the poor reptile. Let us see. It matters little what exact amount of precedency is conceded to the tortoise; but say that he is allowed a start of one-tenth part of the whole course. Quite as little does it matter by what ratio of speed Achilles surpasses the tortoise; but suppose this ratio to be that of ten to one, then, if the racecourse be ten miles long, our

friend the slow-coach, being by the conditions entitled to one-tenth of the course for his starting allowance, will have finished one mile as a *solo* performer before Achilles is entitled to move. When the *duet* begins, the tortoise will be entering on the second mile precisely as Achilles enters on the first. But, because the Nob runs ten times as fast as the Snob, whilst Achilles is running his first mile, the tortoise accomplishes only the tenth part of the second mile. Not much, you say. Certainly not very much, but quite enough to keep the reptile in advance of the hero. This hero, being very little addicted to think small beer of himself, begins to fancy that it will cost him too trivial an effort to run ahead of his opponent. But don't let him shout before he is out of the wood. For, though he soon runs over that tenth of a mile which the tortoise has already finished, even this costs him a certain time, however brief. And during that time the tortoise will have finished a corresponding subsection of the course—*viz.*, the tenth part of a tenth part. This fraction is a hundredth part of the total distance. Trifle as that is, it constitutes a debt against Achilles, which debt *must* be paid. And whilst he *is* paying it, behold our dull friend in the shell has run the tenth part of a hundredth part, which amounts to a thousandth part. To the goddess-born what a flea bite is that! True, it is so; but still it lasts long enough to give the tortoise time

for keeping his distance, and for drawing another little bill upon Achilles for a ten-thousandth part. Always, in fact, alight upon what stage you will of the race, there is a little arrear to be settled between the parties and always *against* the hero. 'Vermin, in account with the divine and long-legged Pelides, Cr. by one billionth or one decillionth of the course,' much or little, what matters it, so long as the divine man cannot pay it off before another installment becomes due? And pay it off he never will, though the race should last for a thousand centuries."

It may be argued (as indeed it has been) that we can easily calculate the exact spot where Achilles will overtake the tortoise. But such a solution clearly misses the point. "Of course . . . it becomes easy, upon assuming a certain number of feet for the stride of Achilles, to mark the precise point at which that 'impiger' young gentleman will fly past his antagonist like a pistol shot, and being also *'iracundus, inexorabilis, acer,'* will endeavor to leave his blessing with the tortoise in the shape of a kick (though, according to a picturesque remark of Sidney Smith, it is as vain to caress a tortoise, or, on the other hand, to kick him, as it is to pat and fondle, or to tickle, the dome of St. Paul's)."

It is often said, somewhat patronizingly, that had Zeno grasped the modern notion of a differential coefficient, the limiting value of the ratio of two infinitesimals, there would have been no paradox.

This is the solution of Leibnitz and it is the one which De Quincey accepts. "The infinity of space in this race of subdivision is artfully run against a *finite* time; whereas, if the one infinite were pitted, as in reason it ought to be, against the other infinite, the endless divisibility of time against the endless divisibility of space, there would arise a reciprocal exhaustion and neutralization that would swallow up the astounding consequences, very much as the two Kilkenny cats ate up each other."

It must be remarked, however, that this solution is equally beside the point. The real difficulty, when the argument is properly stated, is to come to the end of an infinite series—that is, to come to the end of something that has no end by definition. The real fallacy, I believe, lies in an ambiguity in definition. The arguer defines an infinite series as one which has no *last term,* and later revokes the condition for his opponent, reinserting the last term as something that has to be passed through *for him.* Briefly the steps are these: "Achilles, in order to catch the tortoise, must pass through the last term of an infinite series. But an infinite series *has no* last term. Accordingly, in order to catch the tortoise, Achilles must do that which (by definition) he cannot do." The solution is to reject the major of this syllogism. If the series has no last term there is no need to pass through *a last term* in order to reach the limit. The last term, which is excluded

as a *possible* obstacle in the original definition, is reinvoked as a *real* obstacle for him against whom the argument is directed.

Exercises

1. Given an original illustration of each one of the fallacies specifically named in this chapter.
2. Examine the following statements and set forth clearly the sophism or paradox therein contained:

   A man accustomed to put his trust in dreams, one night dreamed that all dreams are vain. (From Jeremy Taylor's sermon on "The Deceitfulness of the Heart.")

   The Cretan Epimenides says that "all the Cretans are liars."

   The riches of a producer depend on the scarcity of his commodity. (From Bastiat, *Sophismes Économiques.*)

   Wealth consists in the abundance of things. The many who have little, combine to protect the few who have much.

3. Select from the following such as contain a "circle" in definition:

   Exceptive propositions affirm a predicate of all the subject with the exception of certain defined cases.

   An *affirmative* proposition is one in which an agreement is affirmed between the subject and the predicate.

   A *number* is anything which is the number of some class.

By the *mass* of a body is meant the quantity of matter contained in the body.

Force is that which tends to modify motion.

4. What ambiguities are implied in the following expressions:

"With respect to the appearance of this work (Fichte's *Characteristics of the Present Age*), I have nothing further to say to the Public than that I have nothing to say."

"Let anyone who reads this work without understanding it, assume no more than this: that he does not understand it."

"I have no other but a woman's reason,
I think him so, because I think him so."
—*Two Gentlemen of Verona,* Act I, Sc. ii.

"Non amo te, Sabidi, nec possum dicere quare;
Hoc tantum possum dicere, non amo te."
—MARTIAL, Ep. I., xxxiii.

5. Examine the argument given below in order to determine its validity or invalidity:

Differences cannot be expressed, for suppose two things, x and y to be different. Then we should say "x is not y. Now y is a way of existing and, consequently, not-y is a way of not existing; so that, in trying to express a difference, we have only said that x is a way of not existing."

IMMEDIATE INFERENCE

CHAPTER VI

THE UNIVERSE OF THE CATEGORICAL FORMS

We have seen that the categorical forms, A, E, I, and O, are composed of the terms (*a* and *b*), an adjective of quantity (*all, no, some, not all*) and the copula (*is*). In previous chapters we have noticed many cases in which the terms and their relations (*all is, no is, some is, not all is*) take on ambiguous meanings. In particular it has been said that the word *some* is to be taken in the sense of *some at least, possibly all.*

The student may well inquire by what right it is that we are allowed to understand this word in any sense we please. We reply that this meaning of the word is unambiguously forced upon us by the propositions which we say shall be true or untrue in our science. For example, we are going to say that

$$\mathrm{A}(ab) \text{ implies } \mathrm{I}(ab)$$

is a true, or valid, implication, and this would not be the case if *some* meant *some, not all.* We are going to say, too, that

$$\mathrm{I}(ab) \text{ implies } \mathrm{O}(ab)$$

is an untrue, or invalid, implication. But such an

implication would *follow,* would be true, if the word *some* were taken in this latter sense. We intend that the propositions which are valid or invalid in our system shall be confirmed as true or untrue by common sense. The meaning first given, *some, at least, possibly all,* is the interpretation which will be always verified in experience, when we come to apply our theory practically.

MEANING OF THE TRUE AND UNTRUE

There are two other words with which we shall have to deal, whose sense is best rendered ambiguous at the outset. Thus, *true* means *necessarily true,* true in all cases, true for all meanings of the terms. If the student were to represent the sense of "some a is b" by means of the diagram (Fig. 5) below

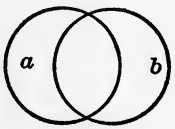


FIG. 5

it might then appear to him that the implication,

$$\text{I } (ab) \text{ implies O } (ab),$$

is true. That this is only an *apparent* truth, would

have been manifest at once, if he had employed instead either one of the diagrams of Fig. 6.

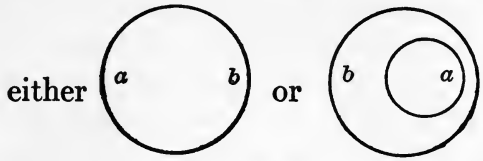


FIG. 6

as his representation of "some a is b."

The word *untrue,* in turn means *not necessarily true,* not true in every instance, not true for all meanings of the terms; that is, there is at least one set of meanings of the terms which will invalidate the proposition in question. Thus, in order to become aware that the implication,

$$\mathrm{I}(ab) \text{ implies } \mathrm{O}(ab),$$

is not generally true, it would be enough to point to *either one* of the diagrams of Fig. 6, or to assign appropriate concrete meanings to the terms. Thus if a stands for metals and b stands for elements,

"If some metals are elements,
then some metals are not elements,"

the untruth of the general statement is at once manifest. If the illustration selected had been

"If some red substances are elements,
then some red substances are compounds,"

the untruth of the original implication would not have been shown.

THE PROPOSITIONAL UNIVERSE

These matters being clear, we may pass to the chief topic of this chapter, which is to explain what is meant by the *universe* of the categorical forms and to define certain technical expressions. In the last chapter, when we represented the categorical propositions by means of diagrams, we assumed that there is a certain analogy between the manner in which closed areas overlap and the manner in which classes overlap. This analogy was first pointed out by the mathematician Euler in a popular work on "natural philosophy" entitled *Letters Addressed to a German Princess,* and such diagrams are, accordingly, referred to as Euler's diagrams. If the student will examine the figures set down at the end of the last chapter, it will be intuitively clear to him, if he assumes this analogy, that any two classes, *a* and *b,* must be related in one, and cannot be related in more than one, of the following five ways (Fig. 7):

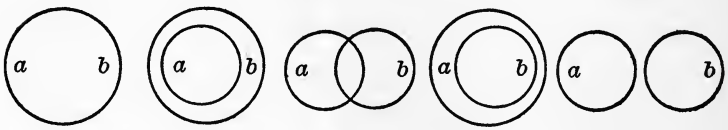


FIG. 7

These five cases may be conceived as five possibilities, one and only one of which can be realized in any particular case. That is, for any pair of concrete meanings of *a* and *b* (triangles and trilaterals, elements and compounds, Shakespearean scholars and Englishmen, etc.) one of the five possibilities is realized and the others remain unrealized. If I assert that one of these five representations is the true one, no matter what meanings the terms may take on, I assert something that is true. In the form of a disjunction the assertion would be, "Either the first, or the second, or the third, or the fourth, or the fifth possibility must be realized" for every meaning of *a* and *b*. This disjunction is called the **propositional universe,** or the **universe of the categorical forms,** or, again, the **logical sum** of all the possibilities.

If it is clear that at least one of these diagrams represents the true relation of *a* to *b,* it will be equally manifest that the relation of *a* to *b* cannot be represented in more than one of these five ways. If I assert the contrary to this last condition, I say something that is false. In the form of a conjunction this assertion would be, "Both the first (say) and the last (say) possibility are realized" at once. Such a conjunction is called the **propositional null,** or, again, the **logical product** of two or more of the possibilities.

CONTRADICTORIES, CONTRARIES, SUBCONTRARIES AND SUBALTERNS

By means of this conception of a propositional universe the more fundamental relations connecting the categorical forms may be established at once. Since "all *a* is *b*" asserts that one of the first two possibilities is realized and "some *a* is not *b*" asserts that one of the last three possibilities is realized, the disjunction,

"Either all *a* is *b* or some *a* is not *b*,"

—that is, the assertion that "either A is true or O is true," is precisely equivalent to the *propositional universe,* and is, therefore, of necessity a true statement. Similarly, the conjunction,

"All *a* is *b* and some *a* is not *b*,"

—is equivalent to the *propositional null,* and is false, for A and O contain no possibilities in common. Accordingly, A and O cannot both be true and cannot both be false.

In general, whenever two categorical propositions contain one or more possibilities in common, they may both be true, but not otherwise. Thus, I and O may both be true, but A and E cannot both be true. Whenever two categorical propositions, taken together, do not make up the universe of possibilities, they may both be false, but not otherwise.

Thus, A and E may both be false, but I and O cannot both be false.

We proceed to set down the following definitions, which will prove to be of great importance for our subsequent theory:

Two propositions which cannot both be true and cannot both be false are called **contradictories.**

Two propositions which cannot both be true but which may both be false are called **contraries.**

Two propositions which may both be true but which cannot both be false are called **subcontraries.**

Two propositions which may both be true and which may both be false are called **subalterns.**

The student who has made only a slight progress in his mathematical studies will still realize that we cannot classify the four assertions, A, E, I, and O, under these heads by a mere reference to a set of Euler's diagrams. The truths that we assume without demonstration must appear among our axioms, however "self-evident" they may otherwise seem. We accordingly assume:

Postulate 1.—A and O cannot both be true and cannot both be false.

Postulate 2.—E and I cannot both be true and cannot both be false.

From these assumptions it follows that A and O and that E and I are contradictory pairs. In the next chapter postulates and principles will be set down and theorems will be deduced from them,

by means of which it will be possible to say that A and E are contraries, that I and O are subcontraries, and that A and I, and E and O, are subalternate pairs. As a preliminary exercise, however, the student should scrupulously verify these facts for himself, employing the diagrams of Fig. 7 with this end in view. In order to facilitate this verification as well as to emphasize its importance, the figure is again reproduced on this page below.

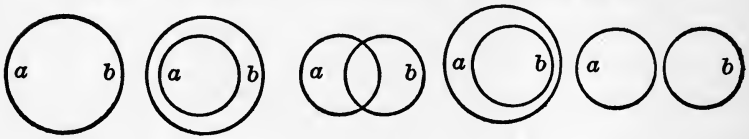


FIG. 8

EXERCISES

1. What propositions must be true and what ones must be false, when we take A, E, I, and O to be true in succession?
2. What propositions must be true and what ones must be false, when we take A, E, I, and O to be false in succession?
3. Draw a set of diagrams which will represent A, E, I, and O when the terms, *a* and *b*, have been reversed. In what cases does this alteration leave the original meaning unchanged?
4. In an argument your opponent has managed to establish the truth of a proposition, which is subcontrary to the one which you are maintaining yourself. How would you retort his contention?
5. Is it more desirable in an argument to establish the contrary of your opponent's view or the contradictory?
6. Assume that the first four of Euclid's axioms must be affirmed, but that either of the remaining two may be denied. If the fifth and sixth axioms are subcontraries, how many geometries different from Euclid's are possible?

CHAPTER VII

THE MOODS OF IMMEDIATE INFERENCE

In the hypothetical proposition, x implies y (if x is true, then y is true), the part x to the left of the word *implies* is called the **antecedent** and the part y to the right is called the **consequent.** Here x and y may stand for any sort of proposition, but if each one is a single categorical form, then we should replace x and y by a more definite notation, for example, "A(ab) implies I(ba)," "if E(ab) is true, then A(ab) is false," etc. Any implication of this latter specific type is known as **immediate inference.**

It will be recalled that the comma in the bracket between the terms is used in order to indicate that the term-order is not settled. Thus, just as O(a, b) may represent either O(ab) or O(ba), so all propositions like "A(a, b) implies A(b, a)" may have either one of two term arrangements. A difference between two forms of inference which is dependent on term-order alone is known as a difference of **figure.**

FIGURES OF IMMEDIATE INFERENCE

If the term-order in the antecedent is the same as the term-order in the consequent—that is, if,

for example, "A(a, b) implies A(a, b)" be written:

either "A(ab) implies A(ab),"
or "A(ba) implies A(ba),"

then "A(a, b) implies A(a, b)" is said to be expressed in the *first figure* of immediate inference. If the term-order in the antecedent is the reverse of the term-order in the consequent—that is, if, for example, "A(a, b) implies A(a, b)" be written,

either "A(ab) implies A(ba),"
or "A(ba) implies A(ab),"

then "A(a, b) implies A(a, b)" is said to be expressed in the *second figure* of immediate inference. It is clear that this implication will be true in the first, but untrue in the second figure, so that a difference of figure may very possibly involve a difference in the *truth-values* of the two cases.

ARRAY OF IMMEDIATE INFERENCE

It is evident that all the variants of immediate inference are to be gotten by permuting the four letters A, E, I, and O, two at a time, and by taking each letter once with itself. We should thus obtain sixteen distinct propositions of the type we are considering, as follows:

MOODS OF IMMEDIATE INFERENCE

A (a, b) implies A (a, b)
A (a, b) implies E (a, b)
A (a, b) implies I (a, b)
A (a, b) implies O (a, b)
E (a, b) implies A (a, b)
E (a, b) implies E (a, b)
E (a, b) implies I (a, b)
E (a, b) implies O (a, b)

I (a, b) implies A (a, b)
I (a, b) implies E (a, b)
I (a, b) implies I (a, b)
I (a, b) implies O (a, b)
O (a, b) implies A (a, b)
O (a, b) implies E (a, b)
O (a, b) implies I (a, b)
O (a, b) implies O (a, b)

It will be convenient from time to time to leave unexpressed the word *implies* and the (a, b) and to write down the same set of sixteen implications in the following more abbreviated fashion:

AA	EA	I A	OA
AE	EE	I E	OE
A I	E I	I I	O I
AO	EO	I O	OO

Each proposition of the set may be expressed in

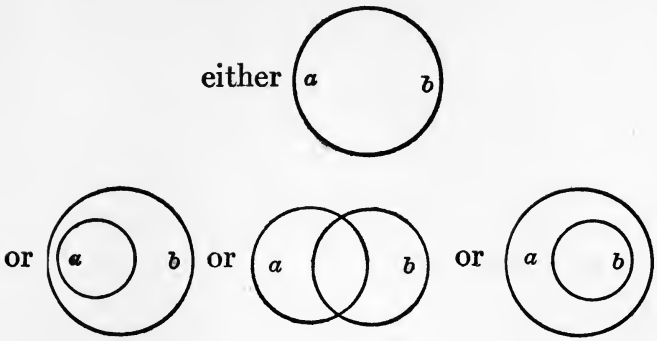
either the first or the second figure and there are, consequently, thirty-two possible forms of immediate inference. The entire set of thirty-two is said to constitute the **array** of immediate inference. Each member of the array is called a **mood** of the array. The true propositions of the array are called **valid moods** of the array. The remainder are called **invalid moods** of the array.

VALIDITY AND INVALIDITY DETERMINED BY EULER'S DIAGRAMS

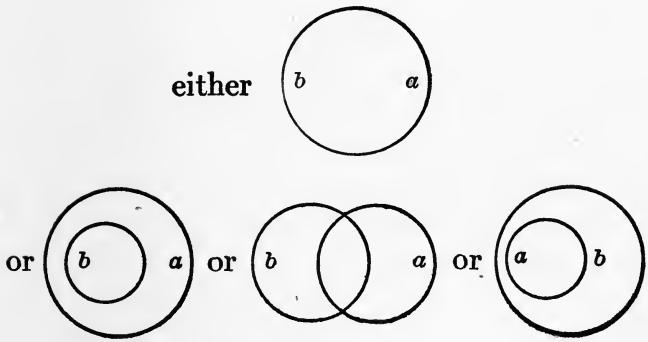
In order to determine precisely what are the valid and what are the invalid moods of this set, let us employ the method of inspection by means of diagrams which was explained in the last chapter. A few examples will suffice to illustrate this method. The student in completing the exercise which is here proposed, will do well to direct his attention to Fig. 7 of the last chapter.

(1) Consider the mood E(*ab*) implies O(*ab*), or, in our abbreviated notation, EO in the first figure. This asserts that if the fifth possibility (Fig. 7) is realized, then at least one of the last three possibilities is realized. It is intuitively evident then that EO in the first figure is a valid mood.

(2) Consider the mood I(*ab*) implies I(*ba*), or, in our abbreviated notation, II in the second figure. I(*ab*) is represented by



and I (ba) is represented by



These two modes of representation are identical, except that the diagrams do not appear in the same order. But, since the order in which the diagrams appear is irrelevant, it is intuitively clear that the mood is a valid one. If we had chosen to consider the mood AA in the second figure, it would have appeared at once that not all of the possibilities

contained in the antecedent are contained as well in the consequent, and the empirical invalidity of the mood would have been manifest at once.

In general, if the antecedent is of the *same form* as the consequent and the mood is valid in the second figure, then the antecedent (or, indifferently, the consequent) is said to be a **convertible** form. The operation of **simple conversion** consists in the interchange of subject and predicate and the proposition in question is said to be **simply convertible.** The student will discover that this operation is permissible in the case of E and I, but not in the case of A and O.

(3) Consider the mood, I(*ab*) implies A(*ab*). It is clear that if the terms are such as to realize either the third or the fourth possibility (Fig. 7), then I(*ab*) is true and A(*ab*) is false. Accordingly, the mood is invalid.

DEDUCTION OF THE VALID MOODS

This case leads us to make again the important observation: Since true means *necessarily true* and untrue means *not necessarily true,* it is enough to point to one diagrammatic representation of the antecedent which at the same time is not a diagrammatic representation of the consequent, in order to become aware of the invalidity of the mood. It is said of certain treatises of the Hindus on geometry, that the master, instead of offering a proof of the

separate theorems, was content, after stating the proposition, to draw the figure and write under it a word like *ecce*. The pupil was thus expected to gather intuitively the abstract or general truth from the observation of a single illustration. The student is well aware that the ideal of the Greek geometers was to deduce the theorems of the science from the fewest possible number of initial assumptions. Whether this ideal be a mistaken one or not, it has at least inspired the procedure of all science down to the present day. If we were to apply this historical contrast of the Greek and the Hindu geometers to ourselves, we might say that up to now our study of logic has been carried out on the Indian plan. Up to now we have been Hindu logicians, for we have been content merely to write *ecce* underneath our diagrams—a sort of Cartesian test, an application of the *clare et distincte percipio*. But from this moment forth we shall fashion our doctrine after the Helladian model. We shall deduce all the true and all the untrue variants of immediate inference by the aid of certain principles from the fewest possible number of initial postulates.

Definition.—Two propositions that cannot both be true and cannot both be false are said to be **contradictory.** By the postulates of the preceding chapter it follows that A(*ab*) and O(*ab*) and that E(*ab*) and I(*ab*) are contradictory pairs.

Principle I.—If in any valid mood antecedent and consequent be interchanged and each be replaced by its contradictory, a valid mood will result.

Postulate 1.—A(ab) implies A(ab),
Postulate 2.—A(ab) implies I(ab),
Postulate 3.—I(ab) implies I(ba),
Theorem 1.—O(ab) implies O(ab),
(from Postulate 1, by Principle I),
Theorem 2.—E(ab) implies O(ab),
(from Postulate 2, by Principle I),
Theorem 3.—E(ba) implies E(ab),
(from Postulate 3, by Principle I).

These are as many results as can be gotten from our assumptions. We therefore proceed with the introduction of an additional principle and with a definition which will make its application possible.

Definition.—If x implies y is a valid implication. then x is said to be a **strengthened** form of y and y is said to be a **weakened** form of x.

This definition of the meaning of strengthening and weakening is not to be taken in the traditional way, but in a more general sense. If it happens to be true, for example, that y implies x in addition to the fact that x implies y, then y will not only strengthen to x, but will also weaken to x. Thus, by postulate 3, I(ab) weakens to I(ba) and I(ba) strengthens to I(ab). But since postulate

3 can also be written I(*ba*) implies I(*ab*), this latter expression being only another way of writing II in the second figure, it follows that I(*ba*) is also a strengthened form of I(*ab*) and that I(*ab*) is also a weakened form I(*ab*). Again A(*ab*) weakens to I(*ab*) and I(*ab*) strengthens to A(*ab*) by postulate 2. In applying the principle about to be given, it must be noticed that the theorems just established give us the right to strengthen or to weaken in the same sense as do the postulates.

Principle II.—If in any valid mood the antecedent be strengthened or the consequent be weakened, a valid mood will result.

Theorem 4.—A(*ab*) implies I(*ba*),
(for Postulate 3 gives us the right to weaken the consequent of Postulate 2).

Theorem 5.—E(*ba*) implies O(*ab*),
(for Theorem 3 gives us the right to strengthen the antecedent of Theorem 2).

Theorem 6.—I(*ab*) implies I(*ab*),
(for Postulate 3 may be written in either of two ways, as explained above. Accordingly, Postulate 3 gives us the right to strengthen its own antecedent or to weaken its own consequent).

Theorem 7.—E(*ab*) implies E(*ab*),
(for, similarly, Theorem 3 gives us the right

to strengthen its own antecedent or to weaken its own consequent. Or we might have arrived at the same result by applying Principle I to Theorem 6).

DEDUCTION OF THE INVALID MOODS

We have, accordingly, by postulating the validity of three of the moods of immediate inference deduced the remaining seven by the aid of two principles. These two, as well as the two which are given below, will have to be assumed later on in any case, but in a more general form. The deduction of the invalid moods is felt as an exercise for the student. Since it will be necessary to postulate four of these moods as invalid, he will have eighteen theorems to deduce. The postulates and the principles of deduction are given below. It is only necessary to add that the additional results of theorems 4-7 (above) must be kept in mind when he comes to apply Principle IV (below).

Postulate 4.—A (ab) does not imply A (ba),
Postulate 5.—A (ab) does not imply O (ba),
Postulate 6.—A (ab) does not imply O (ab),
Postulate 7.—E (ab) does not imply I (ab).

Principle III.—If in any invalid mood antecedent and consequent be interchanged and each be re-

placed by its contradictory, an invalid mood will result.

Principle IV.—If in any invalid mood the antecedent be weakened or the consequent be strengthened, an invalid mood will result.

Theorems.—The other (18) invalid moods.

Exercises

1. The process by which we infer I from A or O from E in the second figure, is called *conversion by limitation* or *per accidens*. Cast the following into categorical form and convert by limitation:

"A favorite has no friend."

2. When the terms of a proposition are simply converted, the resulting proposition is called the *converse* and the original proposition is called the *convertend*. What is the converse of the following:

"No man e'er felt the halter draw,
With good opinion of the law."

3. Immediate inference by *privative conception* consists in passing from an affirmative to a negative equivalent to it, or *vice versa*. Thus, "all metals are elements" is the same as "no metals are compounds"; "some elements are not metals" is the same as "some elements are non-metals." Effect this transformation in the statements of Exercises 1, 2, 4, and 5.
4. Conversion by *contraposition* consists in replacing the terms by their negatives and interchanging them. It is not permissible in the case of E and I. Convert by contraposition:

"All that glisters is not gold."

5. Transform the following by privative conception and convert the result by contraposition and by limitation:

"No man can eat his cake and have it, too."

CHAPTER VIII

THE RULES OF IMMEDIATE INFERENCE

It is the custom of the traditional logic to formulate certain rules by whose aid the invalid moods of immediate inference may be detected immediately. These rules all turn upon the meaning of a *distributed* term. We begin, therefore, with an explanation of the sense of this conception, giving the definition at the outset and setting forth its application in the sequel.

DISTRIBUTED TERMS

Definition I.—Distributed terms are those modified, either implicitly or explicitly, by the quantitative adjectives "all" or "no." All others terms are **undistributed.**

In the first place, it is to be noticed that before the predicate of A and the predicate of I, the word "some" is unexpressed but understood. When we assert "all *a* is *b*," we mean: "all *a* is some (it may be all) *b*"; and the same remark holds of I. This fact may be more easily seen to hold of I, if we appeal to the property of simple convertibility of this form. When "some *a* is *b*" is written equivalently, "some *b* is *a*," the quantitative adjective

which is implicit before the predicate in the first case becomes explicit before the subject in the second case. The predicate of A and the predicate of I are, therefore, according to our definition, undistributed terms. It is equally clear that the subject of A is distributed, since it is modified by "all," and that the subject of I is undistributed, since it is modified by "some."

That the subject of E, "no *a* is *b*," is distributed, is at once apparent from our definition. But the distributed character of the predicate will be manifest as well, if we appeal to the property of the simple convertibility of E, established in the last chapter. Thus, "no *a* is *b*" being logically equivalent to "no *b* is *a*," the quantity of the predicate-term becomes explicit when it is made the subject. The same result would appear in another way if we were to assume the right to change E into A by privative conception, expressing it in the form "all *a* is non-*b*," and then in the form, "all *b* is non-*a*," the terms being then explicitly modified by the adjective "all." Accordingly, E distributes both its subject and its predicate by definition.

As regards the O-form, "some *a* is not *b*," it is apparent at once that the subject is an undistributed term, for it is modified by "some" and not by "all." But it is not so easy to see that the predicate is distributed. In order to become aware of this fact, imagine the part "some *a*" to represent

a fixed part of the *a* class. We may then imagine the contradictory of this part and designate it by the phrase, "non-some *a*." This part will constitute everything that is not "some *a*." The student will then be able, perhaps by the aid of a diagram which he may construct for himself, to understand that "some *a* is not *b*" is exactly rendered by the phrase, "all *b* is non-some *a*." The meaning which was implicit before the predicate in the first form has become explicit before the same term appearing as the subject in the new but equivalent expression. We conclude, then, that O distributes its predicate, but does not distribute its subject. These results appear in the following scheme, the distributed terms being printed in black letter:

A(***a*** *b*)	E(***a*** ***b***)
I(*a* *b*)	O(*a* ***b***)

We shall now state the first rule for the immediate detection of the invalid moods of immediate inference and we shall only introduce additional ones when it shall have been shown that this one is not in itself sufficient to effect our purpose.

Rule 1.—A form in which a given term appears undistributed does not imply a form in which that same term appears distributed.

Consider the mood A (*ab*) implies A (*ba*), or, in our abbreviated notation, AA in the second figure. The predicate of the antecedent is an undistributed term, but it appears distributed as the subject of the consequent. The mood is, consequently, declared invalid by the first rule. Again, in the mood AE in the first figure the subject term is distributed in both antecedent and consequent, but the predicate of the antecedent is distributed in the consequent. The mood is therefore declared invalid by the rule.

The student would now do well to construct the array of immediate inference for himself and to determine precisely just which moods in each figure come under the rule in question. He will find that some moods remain whose invalidity is not declared. We proceed, accordingly, to formulate two additional rules, which will prove exactly enough to effect our purpose. These will have to be preceded by definitions which will render them applicable.

AFFIRMATIVE FORMS AND NEGATIVE FORMS

Definition 2.—A form whose predicate is undistributed is called an **affirmative** form. By results already established it follows that A and I are affirmative. This definition will very possibly bewilder the student upon first consideration, for he will miss the motive which prompts it. He will rather have expected us to define an affirmative form

by means of a *synonyme,* after the fashion of the dictionary. Instead of that we have followed a procedure which is usual in science; we have selected a *property* which is characteristic of affirmative forms, but which does not characterize the others, and we have used this property in order to define them. Our next definition is:

Definition 3.—A form which distributes its predicate is called a **negative** form. By results already established it follows that E and O are negative forms. The two rules which remain to be stated are:

Rule 2.—An affirmative form does not imply a negative form.

Rule 3.—A negative form does not imply an affirmative form.

These three rules will be found *sufficient* for the purpose in hand, for it will be discovered that by means of them all the moods previously found to be invalid are declared untrue. That they are also *necessary*—that is, that no one of them can be dispensed with—will appear at once from the following consideration: Suppose that an invalid mood has been found that is declared invalid by the first rule and by no other rule. It is clear that this rule could not then be omitted from our list; and the same remark applies to the other two. The three rules are all necessary because we can point to at least one example which falls uniquely under each rule.

COROLLARY TO THE RULES

In addition to the rules there is a corollary which follows upon their assumption, and whose application depends upon the following:

Definition 4.—A form which distributes its subject is said to be **universal**. By results already established A and E are universal forms.

Definition 5.—A form which does not distribute its subject is said to be **particular.** By results already established I and O are particular forms. The facts that have now been made matters of definition are conveniently remembered by means of the mnemonic scheme which is given below, the distributed terms being printed in black letter.

	Affirmative	Negative
Universal	A (***a*** *b*)	E (***a*** ***b***)
Particular	I (*a* *b*)	O (*a* ***b***)

Corollary.—A particular form does not imply a universal form.

This theorem will be proven by showing that every one of the moods in question are declared invalid by one or more of the rules. Thus, OA in both figures is thrown out by the third rule and IE, IA and OE in both figures by the first rule.

RULES OF IMMEDIATE INFERENCE

A generalization which is based upon an examination of specific instances is said to be arrived at by **induction.** If the instances examined are all the instances that there are, as in the case of our three rules and the corollary, it is said to be **complete,** and the general truth arrived at is said to be based upon a **perfect** induction.

Exercises

1. Is the proof of the binomial theorem in ordinary algebra based upon a complete induction?
2. Does a generalization founded upon a single instance possess any degree of probability? Compare in this connection the following arguments:

   This box contains a dozen buttons; therefore, every box contains a dozen buttons.
   This solar system has eight planets; a fact that may well be true of every solar system.
   I am aware of the existence of my own mind by direct introspection; other men's behavior is apparently purposive and rational and like my own; therefore, other men, too, have minds.

3. Construct the array of immediate inference and place after each invalid mood the number of a rule or corollary that declares it to be invalid.
4. Prove that there is only one invalid mood which illustrates the second rule uniquely.
5. Make a list of examples which fall uniquely under the first and under the third rule.
6. Why is it that there is no unique illustration of the corollary?

SYLLOGISM

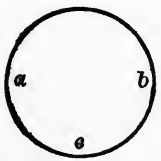
CHAPTER IX

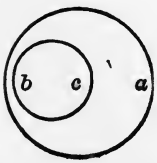
MOODS AND FIGURES OF THE SYLLOGISM

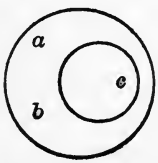
We have now to study an array of a somewhat more general character than the one of immediate inference, and we may begin, not by describing it in the abstract, but by directing attention to a few specific examples. Consider the proposition:

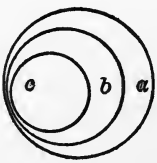
$$\mathrm{A}(ba) \text{ and } \mathrm{A}(cb) \text{ implies } \mathrm{A}(ca),$$

and suppose that it is our desire to represent the antecedent as a whole. The diagrams below will evidently exhaust all the modes of representation that are possible.

either 

or 

or 

or 

It will be observed that each one of the four ways of representing the antecedent is at the same time a

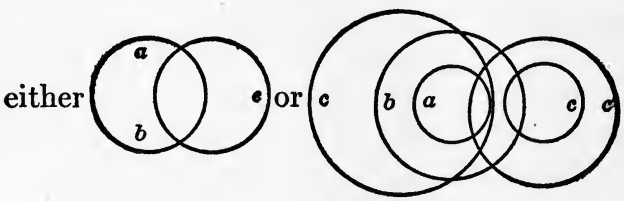
way of representing the consequent. Accordingly, if *a*, *b* and *c* are related as in the antecedent, then it follows that *a* and *c* are related as in the consequent, so that the original proposition is a valid implication.

RULE FOR CONSTRUCTING THE DIAGRAMS

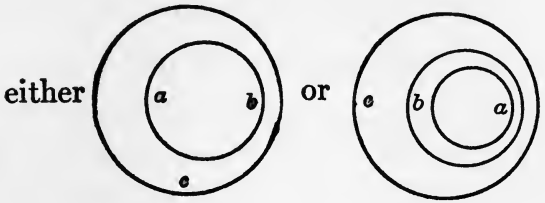
The rule for constructing the diagrams which will represent the antecedent as a whole, is this: if the second form in the antecedent has (say) three modes of representation, then represent the first form completely three times (on three separate lines) and add to the first line the first way of representing the second form in the antecedent, to the second line the second way and to the third line the third way. The antecedent will then be completely represented as a whole. For example, consider the implication:

$$\mathrm{A}(ab) \text{ and } \mathrm{O}(cb) \text{ implies } \mathrm{O}(ca).$$

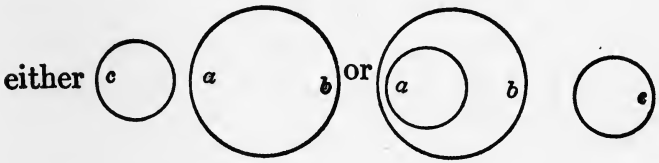
Since $\mathrm{O}(cb)$ is represented in three ways (see Chap. VI, Fig. 7), we represent $\mathrm{A}(ab)$ completely three times. Now supply to the first line the first way of representing $\mathrm{O}(cb)$, that is,



and to the second line the second way of representing O(*cb*),



and, finally, to the third line the third way of representing O(*cb*),



It will be perceived at once that each separate manner of denoting *a*, *b* and *c*, as related in the antecedent, is also a manner of denoting *a* and *c* as related in the consequent. It is intuitively evident, then, as in the last illustration, that the implication is validly drawn. It will be necessary, perhaps, for the student to examine closely the more complicated diagram which appears in the first line, in order to satisfy himself that, together with the others, it exhausts all the possibilities there are.

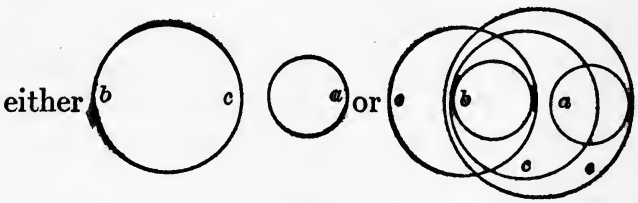
INVALIDITY DETERMINED BY DIAGRAM

Since we have understood *untrue* to mean not necessarily true, it is clear that in order to perceive the invalidity of any proposition of the form under consideration it will be enough to point to a single representation of the antecedent which at the same time is not a representation of the consequent. When such a case is at hand, we are at once made aware of the implication's untruth.

Let us consider, then, a further case:

$$\mathrm{E}(ab) \text{ and } \mathrm{A}(bc) \text{ implies } \mathrm{E}(ca).$$

The complete expression of the antecedent is:



But in the last diagram we have two separate instances of the untruth of $\mathrm{E}(ca)$. Consequently, the implication is invalid.

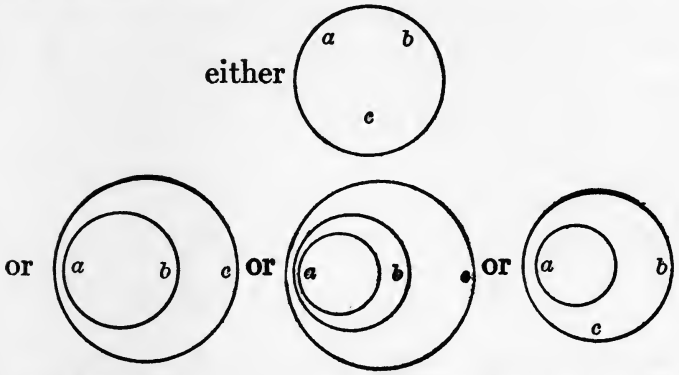
The first example which we examined above was,

$$\mathrm{A}(ba) \text{ and } \mathrm{A}(cb) \text{ implies } \mathrm{A}(ca).$$

Consider now the following variation:

$$\mathrm{A}(ab) \text{ and } \mathrm{A}(bc) \text{ implies } \mathrm{A}(ca),$$

and observe that the two cases differ in regard to their term-order. The complete representation of the antecedent is:



and three distinct instances will be observed in these diagrams of the untruth of the consequent, so that the implication is invalid. It is to be remarked, then, that the validity of an implication of the type under consideration depends not only upon the particular categorical forms which enter into it, but also upon the particular manner in which the terms are arranged.

DETERMINATION OF FIGURE

We shall now determine all the possible ways of arranging the terms. These will evidently be not more than eight in number, *viz.*,

ba	*ab*	*ba*	*ab*
cb	*cb*	*bc*	*bc*
ca	*ca*	*ca*	*ca*

ba	*ab*	*ba*	*ab*
cb	*cb*	*bc*	*bc*
ac	*ac*	*ac*	*ac*

It is clear that the two forms conjoined in the antecedent may be written in either order that we choose. In technical language this fact would be expressed by saying that the conjunctive relation of logic is commutative. We may then, if we wish, always write a specific one of the two first. *We agree as a matter of convention, always to write first the form which contains the predicate of the consequent.* Thus, we write

A(*ba*) and A(*cb*) implies A(*ca*),
rather than A(*cb*) and A(*ba*) implies A(*ca*).

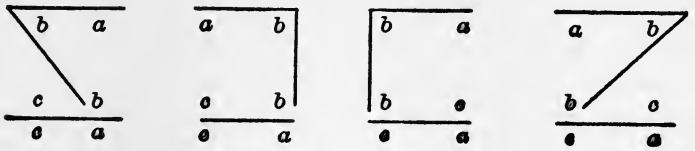
To accord with this convention, the second set above will have to be rearranged, thus:

cb	*cb*	*bc*	*bc*
ba	*ab*	*ba*	*ab*
ac	*ac*	*ac*	*ac*

We shall now show that the term-arrangements in this set are only a repetition of those in the first set above, but in a different order, so that it will turn out that there are only four distinct ways of arranging the terms.

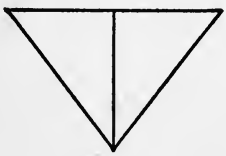
Suppose that we were to draw two lines, one connecting the terms in the categorical form written first in the antecedent and another connecting the

term which does not appear in the consequent. Then the first four varieties of term-order will appear thus:



and the second set will present the same varieties of figure, but with the first and last case reversed. The figures

will in each instance give a very clear geometrical image of the number of possible term-orders. The student will do well to commit to memory at once the four variations of the first set, which we shall constantly refer to as figures 1, 2, 3, and 4, respectively. The four figures are easily remembered as combined in an isosceles triangle standing on its vertex (see below).

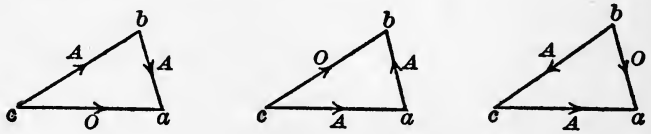


OTHER DIAGRAMMATIC METHODS OF DETERMINING FIGURE

While this method of determining the term-order will prove quite sufficient for all purposes, it is by no means the only device that might be constructed. Form a triangle with the term *a* at the end of the base to the right, the term *c* at the left, and the term *b* at the vertex above. Let an arrow indicate the direction of "flow" from subject to predicate, or, the order subject-predicate. Then if we choose

A(*ba*) and A(*cb*) implies O(*ca*),
A(*ab*) and O(*cb*) implies A(*ca*),
O(*ba*) and A(*bc*) implies A(*ca*),

these three propositions, whose invalidity the student may confirm for himself, would be represented by the diagrams given below:



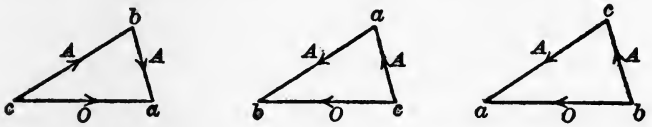
In the sequel the student will have to accustom himself to cases which do not at first appear to belong to any one of the conventional figures. Consider the three term-orders:

ba	*ab*	*ca*
cb	*ca*	*bc*
ca	*cb*	*ba*

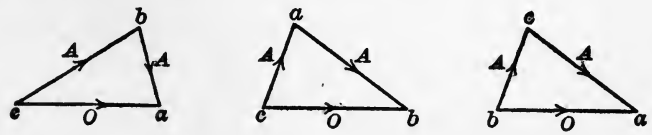
By following the original directions for determining the figure, it will be easy to recognize these as all variations of the first case. If we were to write these out, say in the form:

A(*ba*) and A(*cb*) implies O(*ca*),
A(*ab*) and A(*ca*) implies O(*cb*),
A(*ca*) and A(*bc*) implies O(*ba*),

these three equivalent statements would be represented by means of our triangles as follows:

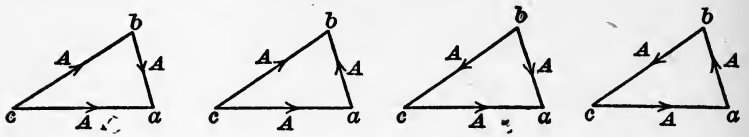


It will be noticed that in each instance the direction of "flow" as indicated by the arrows is continuous and in one direction from the subject of O to the predicate of O. The formal identity of the three cases will appear more clearly if the second and third figures be taken out of the plane of the page and turned over, thus:



Suppose, finally, that we should wish to represent by means of the triangles a single combination of

letters (AAA say) in each one of the four figures. Our diagrams would then appear as follows:



PARTS OF THE SYLLOGISM

We proceed now to summarize these results and to define a certain number of technical terms. If we imagine that the A's below may be replaced in any way by any one of the other letters, E, I, O, then the **syllogism** is a form of implication belonging to one of the following types:

1. A(ba) and A(cb) implies A(ca),
2. A(ab) and A(cb) implies A(ca),
3. A(ba) and A(bc) implies A(ca),
4. A(ab) and A(bc) implies A(ca).

These differences are known as the first, second, third, and fourth **figures** of the syllogism, respectively. The two forms conjoined in the antecedent are called the **premises** and the consequent is called the **conclusion.** The predicate of the conclusion is called the **major term** and points out the **major premise,** which by convention is written first in the antecedent. The subject of the conclusion is called the **minor term** and points out the **minor premise,** which by convention is written second in the antecedent. The term which is common to the premises

and which does not appear in the conclusion is called the **middle term.**

ARRAY OF THE SYLLOGISM

There will evidently be sixty-four syllogistic variations, obtained by taking the permutations of the four letters, A, E, I, O, three at a time. Each one of these may be expressed in each one of the four figures, so that we shall have two hundred and fifty-six cases in all to consider. These are known as the **moods** of the array of the syllogism. True propositions of the array are known as **valid moods** of the array. The remainder are known as **invalid moods** of the array.

In representing the array of the syllogism it will prove convenient, as in the case of immediate inference, to omit the word *and* and the word *implies,* as well as the parts (a, b), (b, c), (c, a) and to exhibit each mood as a simple combination of the three letters. In constructing the array, the best method to employ will be to add to each one of the sixteen permutations of the four letters, A, E, I, O, taken two at a time, each one of the four letters in succession. The array under each figure will then appear thus:

AAA	EAA	IAA	OAA
E	E	E	E
I	I	I	I
O	O	O	O

AEA	EEA	IEA	OEA
E	E	E	E
I	I	I	I
O	O	O	O
AIA	EIA	IIA	OIA
E	E	E	E
I	I	I	I
O	O	O	O
AOA	EOA	IOA	OOA
E	E	E	E
I	I	I	I
O	O	O	O

The student should now construct the array for himself and examine a great number of the moods in each one of the four figures, in order to determine the validity or invalidity of each one, by the method of inspection explained at the beginning of this chapter. We remark that six true propositions will be found under each figure, but in different positions in the array.

We shall assume now that the student has made a list of the valid moods of the syllogism, having applied the method of inspection to the two hundred and fifty-six possible cases. In order that he may verify his results, the six that are valid under each figure are set down below:

1.	2.	3.	4.
A A A	A E E	A A I	A A I
A A I	A E O	A I I	A E E
A I I	A O O	E A O	A E O
E A E	E A E	E I O	E A O
E A O	E A O	I A I	E I O
E I O	E I O	O A O	I A I

THE MNEMONIC LINES

The valid moods of the Aristotelian syllogism are conveniently remembered by means of the following mnemonic lines, the vowels in each separate word standing for the mood in question,

> *Barbara, Celarent, Darii, Ferio*que prioris;
> *Cesare, Camestres, Festino, Baroko,* secundæ;
> Tertia, *Darapti, Disamis, Datisi, Felapton,*
> *Bokardo, Ferison,* habet; quarta insuper addit
> *Bramantip, Camenes, Dimaris, Fesapo,*
> *Fresison.*

This mnemonic first appears in the *Summulæ Logicales* of Petrus Hispanus, who was afterward Pope John XXI, but without the line which records the fourth figure. He does not, however, profess to be the author of it. Several other versions are found in later writers. A Greek mnemonic of the same kind is inserted in early editions of the *Organon* of Aristotle. The moods not listed are

gotten by weakening the universal conclusions where they occur, to particular conclusions. Jevons remarks: "This device, however ingenious, is of a barbarous and wholly unscientific character; but a knowledge of its construction and use is still expected from the student of logic, and the verses are therefore given and explained." What Jevons overlooks is the fact, to be explained immediately, that this is really a first crude attempt at a deduction of the moods and, consequently, a matter of historical interest.

Besides the vowels in each word which stand for the mood in question, the initial consonants, as well as *m, p, s,* and *k,* have each a special significance. Thus, *s* means: convert simply in the preceding premise or conclusion. The letter *p* requires a conversion *per accidens* and *m* indicates an interchange of premises. By performing the indicated operations a mood in the second, third, or fourth figure will be reduced to the first, the initial consonant indicating to which mood of the first figure the reduction will be effected. Two illustrations will suffice to indicate the method.

(1) The mood *Cesare* is E A E in the second figure, or

$$\mathrm{E}(ab) \text{ and } \mathrm{A}(cb) \text{ implies } \mathrm{E}(ca).$$

Here only one change is indicated, that of simple

conversion in the major, the letter *s* following the first vowel. There results, evidently,

$$\mathrm{E}(ba) \text{ and } \mathrm{A}(cb) \text{ implies } \mathrm{E}(ca),$$

and this is the mood *Celarent* recorded in the first line.

(2) The mood *Bramantip* is A A I in the fourth figure, or

$$\mathrm{A}(ab) \text{ and } \mathrm{A}(bc) \text{ impress } \mathrm{I}(ca).$$

Converting the conclusion *per accidens,* which is required by the letter *p,* we get $\mathrm{A}(ac)$, and transposing the premises, as indicated by the letter *m,* the mood becomes

$$\mathrm{A}(bc) \text{ and } \mathrm{A}(ab) \text{ implies } \mathrm{A}(ac).$$

The student will have no difficulty, if he resorts to the method of triangular representation already explained, in recognizing this as A A A in the first figure, the mood recorded as *Barbara* in the first line of the mnemonic verse.

REDUCTIO AD IMPOSSIBILE

The moods *Baroko* and *Bokardo* require a special treatment known as indirect reduction, or *reductio ad impossibile,* and indicated by the letter *k*. In the old logic the premises were taken to be true by

presumption. Consider, now, the mood *Baroko* and suppose the conclusion does not follow from the premises. If O(*ca*) is false, then A(*ca*) is true. Combine this latter form with the major premise and we have

A(*ab*) and A(*ca*) implies A(*cb*),

a mood in *Barbara* whose conclusion contradicts the minor of *Baroko*. Our supposition, then, that the conclusion of *Baroko* does not follow, turns out to be impossible, and the proof depends upon the validity of *Barbara*.

INDIRECT REDUCTION BY OTHER PROCESSES

Indirect reduction may also be effected by other processes, either by attaching the negative particle to the predicate term, or else by the process of conversion by contraposition (see the exercises at the end of Chapter VII and the account of negative terms in Chapter II). Thus, converting the major of *Baroko* by contraposition and attaching the negative particle in minor and conclusion to the predicate term, we have

All *non-b* is *non-a*,
Some *c* is *non-b*,
Some *c* is *non-a*.

If *non-a* and *non-b* be represented by *a′* and *b′*, respectively, this becomes

$$A(b'\ a') \text{ and } I(cb') \text{ implies } I(ca')$$

which will be readily recognized as A I I in the first figure, a mood recorded in the first line of the mnemonic verses as *Darii*.

A similar process may be applied to *Bokardo* as follows: Attach the negative particle to the predicate terms and we should have:

$$I(ba') \text{ and } A(bc) \text{ implies } I(ca').$$

This is the mood *Disamis,* which reduces to *Darii* in the usual way by following out the operations indicated by the letters.

Other moods besides *Baroko* and *Bokardo* are susceptible to this method of indirect reduction. Thus, *Camenes,*

$$A(ab) \text{ and } E(bc) \text{ implies } E(ca),$$

reduces to *Barbara,* if we employ the two operations of conversion by contraposition and by negation—that is,

$$A(b'\ a') \text{ and } A(cb') \text{ implies } A(ca'),$$

and the mood, *Ferison*—that is,

$$E(ba) \text{ and } I(bc) \text{ implies } O(ca),$$

reduces to *Darii,* when we have converted simply in the minor premise—that is,

$$A(ba') \text{ and } I(cb) \text{ implies } I(ca').$$

Exercises

1. Would any of the geometrical images employed in the determination of figure be changed for *Alice Through the Looking Glass?*
2. Reduce the moods of the other figures to those of the first, following the operations indicated in the mnemonic verses.
3. By indirect reduction change *Camestres* to *Barbara, Felapton* to *Darapti,* and *Fresison* to *Datisi.*
4. Reduce *Bokardo* by the method of *reductio ad impossibile.*
5. Remembering that contraries cannot both be true, reduce *Camestres* by the method of the last example.
6. If (*a b c*) is taken in cyclical order—that is, read *ab, bc, ca*—will any other figures result on permuting the three letters?
7. If *ab, bc, ca* stands for the fourth figure, what will be the effect of permuting these pairs in every possible way, regard being had to the proper order of the premises.

CHAPTER X

DEDUCTION OF THE SYLLOGISTIC MOODS

We shall now, as in the case of immediate inference, by postulating the truth of the smallest possible number of the valid moods of the syllogism. deduce the remainder by the aid of two principles. The assumptions which we shall have to make, are as follows:

Postulate 1.—A(*ba*) and A(*cb*) implies A(*ca*),

Postulate 2.—E(*ba*) and A(*cb*) implies E(*ca*),

Principle I.—If in any valid mood either premise and the conclusion be interchanged and each be replaced by its contradictory, another valid mood will result.

Principle II.—If in any valid mood a premise be strengthened or the conclusion be weakened, another valid mood will result.

Theorems.—The remaining (22) valid moods.

EXAMPLES OF DEDUCTION

When the student has carefully studied the examples which are set down below, he should be able to carry out the entire deduction without further aid and the work of doing this should have been

completed before reading the remainder of the chapter.

(1) Suppose that we were to combine the first postulate and the first principle. Interchanging minor premise and conclusion and replacing each by its contradictory we obtain

A(*ba*) and O(*ca*) implies O(*cb*).

Here the major term is *b*, so that the premises are in the normal order, the minor term is *c* and the middle term has become *a*. The figure is now determined in one of the ways already described, *viz.*,

b *a*
c *a*
c *b*

so that if our first theorem, AOO in the second figure, be written according to the original convention, our result becomes

Theorem 1.—A(*ab*) and O(*cb*) implies O(*ca*).

Similarly, by contradicting the major premise and the conclusion and replacing each by its contradictory, we should have obtained OAO in the third figure and this mood, if we employ the original convention of the third figure, becomes

Theorem 2.—O(*ba*) and A(*bc*) implies O(*ca*)

(2) The mood AOO in the second figure being now established as valid, we may apply to it either one of the principles in the same sense as to the

postulates. Let us begin by writing the mood with the terms ordered as in the original convention and, applying Principle II, let us strengthen the minor premise O(*cb*) to E(*bc*). This will be possible by applying a result of immediate inference already established, *viz.*,

$$E(bc) \text{ implies } O(cb).$$

Accordingly, our next result becomes

Theorem 3.—A(*ab*) and E(*bc*) implies O(*ca*), or, AEO in the fourth figure is a valid mood.

(3) Suppose that we were to return now to the first principle and apply it to the result which has just been obtained. Contradicting major and conclusion and interchanging, we obtain immediately

$$A(ca) \text{ and } E(bc) \text{ implies } O(ab).$$

It is important that the student should not fail to observe that the premises are no longer in the normal order and that the normal order must be restored before the figure can be ascertained. Failure to make this change might result, as he will readily see, not only in a mistake in the figure but also in the mood. Our result is, accordingly, EAO in the fourth figure, or, if the terms be ordered as in the original convention,

Theorem 4.—E(*ab*) and A(*bc*) implies O(*ca*).

Had we chosen to contradict and interchange

minor and conclusion of AEO in the fourth figure, we should have obtained in the same way

Theorem 5.—A(ab) and A(bc) implies I(ca). Or A A I in the fourth figure is a valid mood.

It will now be observed that the application of Principle I to any mood in the fourth figure places the premises out of the normal order, but leaves the figure unchanged. Employing a more technical language, we should say that the fourth figure is invariant under Principle I.

Having deduced the twenty-two theorems, the student should set himself the exercise of deriving the valid moods under each figure separately, and he should try to arrive at each result by the fewest possible number of steps. In deducing those under the fourth figure, it will economize steps and so add to the elegance of his demonstration, if he will keep in mind the rule stated in the last paragraph. The following rules, which the student will do well to verify for himself, show the effect on mood and figure of contradicting and interchanging either premise and the conclusion.

Rules of Contradiction and Interchange

Contradicting and interchanging major and conclusion, we should have:

(1) The first figure changes to the third and conversely, and the premises remain in normal order;

(2) The second figure changes to the third with the normal order of the premises reversed;

(3) The fourth figure remains invariant with the normal order of the premises reversed.

Contradicting and interchanging minor and conclusion we should have:

(1) The first figure changes to the second and conversely, and the premises remain in normal order;

(2) The third figure changes to the second, with the normal order of the premises reversed;

(3) The fourth figure remains invariant, with the normal order of the premises reversed.

It will also be found advantageous to state in the form of rules the effect of simple conversion in either premise or in the conclusion.

Rules of Simple Conversion

(1) Simple conversion in the major premise changes the first figure to the second and conversely, the third figure to the fourth and conversely.

(2) Simple conversion in the minor premise changes the first figure to the third and conversely, the second figure to the fourth and conversely.

(3) Simple conversion in the conclusion changes the first figure to the fourth and conversely and the second and third figures remain invariant.

DEDUCTION OF THE INVALID MOODS

It remains in order to complete the solution of the syllogism, to deduce all of the two hundred and thirty-two invalid variants from the fewest possible number of initial assumptions. The most elegant way to proceed will be to begin with a single postulate and a single principle and to introduce further assumptions only when we are compelled to do so. We state, accordingly,

Postulate 3.—E(*ba*) and E(*cb*) does not imply I(*ca*),

Principle III.—If in any invalid mood a premise be weakened or the conclusion be strengthened, another invalid mood will result.

Let us begin by weakening the major to E(*ab*), since E(*ba*) implies E(*ab*); and secondly, by weakening the minor to E(*bc*). Finally, let us weaken the premises to E(*ab*) and E(*bc*) respectively. We shall then have established by postulate and theorem the invalidity of EEI in all four figures. If, now, the E- premises be weakened to O-premises and the I- conclusion be strengthened to an A- conclusion in every possible way, the untruth of

E E I	E O I	O E I	O O I
E E A	E O A	O E A	O O A

will have been established in each one of the four figures. The invalidity of thirty-one moods has, accordingly, been made to depend upon the invalid-

ity of E E I in the first figure alone. It should be noted in this connection that the application of Principle IV (below) to any mood in this set of thirty-two will yield no mood that is not already contained in the set and that Postulate 4 (below) will yield no mood of the set by either principle. We now introduce the second postulate and the second principle.

Postulate 4.—A(*ab*) and A(*cb*) does not imply I(*ca*).

Principle IV.—If in any invalid mood either premise and the conclusion be interchanged and each be replaced by its contradictory, another invalid mood will result.

The application of this principle will offer no difficulty that has not been already overcome, and no doubt the practice which the student has had in the derivation of the valid moods, will enable him to dispense with further illustrations here. Thus we should obtain at once the theorems:

a. A A A (second figure) by 4, iii,
b. A E O (first and third figs.) by 4, iv,
c. A E E (first and third figs.) by b, iii,
d. A I I (second and fourth figs.) by c, iv,
e. I A I (first and second figs.) by d, iii,
f. E A E (third and fourth figs.) by e, iv.

Other moods which follow from this postulate

and whose invalidity may be easily established in all four figures are:

E I E I E E I E O I I I I I A

and of this set of theorems it can be said that each one is independent of the original set of thirty-two.

In order to deduce the invalid moods that remain, it will be necessary to assume five other postulates, of whose independence the student will be able to satisfy himself by considerations similar to those set forth above. These are:

A A O (first fig.)
A A O (fourth fig.)
O A O (first fig.)
A A A (fourth fig.)
E E O (first fig.)

THE RULES OF SYLLOGISM

It was a part of the traditional treatment of the syllogism to formulate certain rules for the immediate detection of the invalid moods. We shall state these and we shall then prove that they are necessary and sufficient for the purpose which they effect.

Rule 1.—Two negative premises do not imply a conclusion.

Rule 2.—Two affirmative premises do not imply a negative conclusion.

Rule 3.—An affirmative premise and a negative premise do not imply an affirmative conclusion.

Rule 4.—Two premises in neither of which the middle term is distributed do not imply a conclusion.

Rule 5.—Two premises in which a given term occurs undistributed, do not imply a conclusion in which that same term occurs distributed.

These rules are *sufficient,* for they declare invalid all moods already recognized as invalid. They are all *necessary,* for we can point to at least one example that falls uniquely under each rule. In seeking unique illustrations of each rule, the student will do well to write out in full the mood to be examined and to underline the distributed terms.

Exercises

1. Beginning each time with *Barbara* and *Celarent,* deduce the valid moods of the second, third, and fourth figures.
2. From A A A (fourth fig.) deduce twenty-six other invalid moods of the syllogism.
3. Construct the array of the syllogism and place after each invalid mood the number of a rule that declares it to be invalid.
4. Make a list of examples that fall uniquely under each one of the five rules.
5. Prove that there can be only one invalid mood that will illustrate the second rule uniquely.
6. Show that, as the result of a complete induction of all of the moods in question, it follows from the rules as a corollary that two particular premises do not imply a conclusion.
7. Show similarly, that it follows from the rules that a universal premise and a particular premise do not imply a universal conclusion.

8. Prove that all moods of the first figure are invalid, wherein the minor is not affirmative or the major is not universal.
9. Prove that all moods of the second figure are invalid, wherein the major is not universal or both premises affirmative.
10. Prove that all moods of the third figure are invalid, wherein the minor is not affirmative or the conclusion is not particular.
11. Establish the following rules of the fourth figure:

    If the major is affirmative, the minor must be universal.
    If the minor is affirmative, the conclusion must be particular.
    Neither premise can be a particular negative nor can the conclusion be a universal affirmative.
    If one premise be negative, the major must be universal.

CHAPTER XI

THE HYPOTHETICAL SYLLOGISM

The forms of implication to which I shall now invite the attention of the reader are generally known as **conditional arguments.** They possess a peculiar attraction for minds whose interest is not readily aroused, save by the applications of a science, or by the enumeration of specific cases, for they conform to certain modes of rhetorical expression which seem natural, because they have become habitual. We cannot do better than begin with the citation of a few examples. The first we shall borrow from the logical compendium of Archbishop Whately. Suppose some one were to argue for the reality of miracles in the following way: "If no miracles had been displayed by the first preachers of the Gospel, they could not have obtained a hearing; but they did obtain a hearing; therefore, some miracles must have been displayed by them." He would, then, employ a form of argument known as the **hypothetical syllogism.** Or, again, suppose a certain theologian of opposite faith were to say: "If the doctrines of Calvin conform with the word of God, it is not necessary to publish them separately, and if they are at variance with the word of

God, they are wicked; but either they conform or they do not; accordingly, either these doctrines are wicked or their publication is unnecessary." An argument of such a form is known as a **dilemma.**

It would be well to examine these cases with especial care, regarding the form and the content of each and endeavoring to settle, without any of the apparatus of logic, the question as to whether the argument is good or bad. After the reading of this chapter it may be profitable to return to consider them again in the light of what will have been learned. The difference between our first judgments, together with the grounds on which we base them, and our later more sophisticated ones, which will then be founded on developed theory, will yield a rough measure of the practical value of this undertaking. The word *dilemma* is from the Greek δι- *two* and λῆμμα *assumption,* and the two parts of the disjunction appearing after the first semicolon are known as the *horns* of the dilemma. Some of the dilemmatic arguments which will be set down below are historically famous, and deservedly so, for it will not always be easy to put our finger on the "screw that is loose in our logical conundrum."

DILEMMA OF THE CROCODILE

The following account of the well-known dilemma denominated "The Crocodile" we shall quote in full from one of the essays of De Quincey:

"I recall at this moment a little metrical tale of Southey's, in which the *dramatis personæ* are pretty nearly the same, *viz.*, a crocodile, a woman and her son. In that case, however, the crocodile is introduced as a person of pattern morality, for the woman says of him—

" 'The king of the crocodiles never does wrong:
He has no tail so stiff and strong
Petitioners to sweep away,
But he has ears to hear what I say.'

Not so the crocodile known to the Greek dialecticians. *He* bore a very different character. If he has no tail to interfere with Magna Charta and the imprescriptible right of petitioning, he had, however, teeth of the most horrid description for crushing petition and petitioner into one indistinguishable pulp; and, in the particular case contemplated by the logicians, having made prisoner of a poor woman's son, he was by her charged with the same purpose in regard to her beloved cub as the Cyclops in the 'Odyssey' avows in regard to Ulysses, *viz.*, that he reserved him in his larder for an *extra bonne bouche* on a gala day. The crocodile, who, generally speaking, is the most uncandid of reptiles, would not altogether deny the soft impeachment, but, in order to sport an air of liberality which was far from his heart, he protested that, no matter for any private views which he might have dallied with

in respect to the young gentleman, he would abandon them all on one condition (but, observe, a condition which he privately held to be impossible for a woman to fulfil), *viz.*, that she should utter some proposition which was incontrovertibly true. The woman mused upon this; for though she knew of propositions that no neutral party could dispute—as this, for instance, that crocodiles are the most odious of vermin—it was evident that her antagonist would repel *that* as an illiberal and one-sided personality. After some consideration, therefore, she replied thus—'You will eat my son.' There and then arose in the crocodile's brain a furious self-conflict, from which it is contended that no amount of Athenian chicanery would ever deliver him; since, if he *did* eat her son, then the woman had uttered a plain truth, which the crocodile himself could not have the face to deny, in which case (the case of speaking truth), he had pledged his royal word *not* to eat him; and thus he had acted in a way to make the word of a crocodile, or his bond, or even the tears of a crocodile, a mere jest among philosophers. On the other hand, if in contemplation of these horrid consequences he did *not* eat her son, then the woman had uttered a falsehood in asserting that he would, and it became a royal duty in *him,* as a guardian of morality, to exact the penalty of her wickedness. . . . Truth absolute was provided for; in that case the son was to be spared.

Absolute falsehood was also provided for; in that case the son was to die. But truth conditional was *not* provided for. Supposing the woman to say something contingent on a case that might or might not be realized, then it became necessary to wait for the event. But here there was no use in waiting, since, whichever of the two possible events should occur, either equally and irretrievably landed the crocodile in a violation of his royal promise."

CONSTRUCTIVE HYPOTHETICAL SYLLOGISM

The **constructive hypothetical syllogism** is of the following general form:

If x is true, then y is true;
but x is true;
therefore y is true.

This argument is called *modus ponens,* or the mood which affirms. Here the minor asserts the antecedent of the major; or, otherwise, what is asserted only hypothetically in the major is asserted absolutely or without qualification in the minor. This condition, of course, allows us to *suppress* the antecedent altogether and to assert the consequent by itself. The general rule is: whenever the antecedent is verified, the consequent is verified itself, provided the implication is a valid one. Thus suppose that I say: if the spring is late, the fruit crop will be abundant; but the spring *is* late; therefore, the

fruit crop will be abundant. The conclusion may be asserted by itself, if the premises are granted.

But it is important to observe that the conclusion *follows* whether the premises are true or not. Let us suppose the possible cases:

(1) x true and y true;
(2) x true and y false;
(3) x false and y true;
(4) x false and y false.

In the first case the major and minor are true and the conclusion may be asserted without qualification; in the second case the major is false and the minor is true and the conclusion cannot be asserted by itself; in the third case the major is true and the minor is false and the conclusion cannot be asserted by itself; in the fourth case the major is true and the minor is false and, again, the conclusion cannot be asserted by itself. Observe, however, that in the third case the conclusion, while it cannot be asserted because of the argument, because the premises cannot be suppressed, may yet be asserted on *extra-logical* grounds—*i.e.*, because it is true in point of fact; and the same remark applies to the first case.

PARADOX OF TRISTRAM SHANDY

In order to illustrate the "common-sense" tendency to suppress the antecedent when the implication seems to be a valid one, we shall quote an argu-

ment of Mr. Bertrand Russell's, an argument known as the paradox of Tristram Shandy: Mr. Russell says: "Tristram Shandy, as we know, employed two years in chronicling the first two days of his life, and lamented that, at this rate, material would accumulate faster than he could deal with it, so that, as years went by, he would be farther and farther from the end of his history. Now I maintain that, if he had lived forever, and had not wearied of his task, then, even if his life had continued as eventfully as it began, no part of his biography would have remained unwritten. For consider: the hundredth day will be described in the hundredth year, the thousandth in the thousandth year, and so on. Whatever day we may choose as so far on that he cannot hope to reach it, that day will be described in the corresponding year. Thus any day that may be mentioned will be written up sooner or later, and therefore no part of the biography will remain permanently unwritten. This paradoxical but perfectly true proposition depends upon the fact that the number of days in all time is no greater than the number of years."

Leaving out of account the question as to whether or not there is a paradox involved in the comparison of the two infinites, let us examine the following hypothetical syllogism: "If Tristram Shandy should live forever, and should not weary of his task, he will complete his biography; but it is agreed

that he shall live forever and shall not weary of his task; accordingly, he will complete his biography." The argument being formally correct, the only question is whether or not the premises may be suppressed and the conclusion asserted by itself. But in the minor it seems that we have agreed that an impossibility shall transpire; not because one cannot live forever for biological reasons, but because one cannot pass through each term of an infinite series, because one cannot come to the end of something that has no end by definition. We have agreed in the minor to regard an impossibility as possible, to regard a false proposition as true. There is no paradox, as soon as we have seen that the premises cannot be suppressed and that, therefore, the conclusion cannot be asserted by itself.

FALLACY OF AFFIRMING THE CONSEQUENT

A familiar fallacy, known as the **fallacy of affirming the consequent,** may be conveniently cited in this connection. Thus, suppose one were to argue:

"If the study of logic furnishes the mind with a multitude of useful facts it will deserve cultivation; now, we agree that it deserves cultivation; accordingly, it must furnish the mind with a multitude of useful facts."

This argument would be formally fallacious. The premises might easily be regarded as true and the conclusion as false under the same circum-

stances, for the consequent might follow from any one of a great number of antecedents. The study of logic might deserve cultivation as an aid to forensics or to legal studies; or, because its history is connected with the general history of philosophical speculation, or, because its technical vocabulary has passed into common use and cannot be properly understood by the mere help of a dictionary; or, because its foundations are presupposed by those of arithmetic and geometry; or, because constituting one of the few intellectual disciplines of the Middle Ages, a knowledge of it casts a flood of light upon the workings of the mediæval mind; and so on for any number of other reasons that might be enumerated.

A similar fallacy, and one not mentioned, so far as my knowledge extends, in the manuals of logic, consists in the inference that, because the conclusion of a true syllogism may be asserted, at least one of the premises may be asserted to be true. This we shall call the **fallacy of affirming the conclusion.** Consider the following argument:

"If all the Troglodytes are virtuous and this man is a Troglodyte, then this man is virtuous; but this man is virtuous; therefore, this man is a Troglodyte, or else all of the Troglodytes are virtuous."

The Troglodytes of the *Lettres Persanes* of Montesquieu were a mythical people, for the most part so savage and evil that the notions of human

justice and equity had ceased to operate practically in their relations with one another. They perished of their own injustice, with the exception of two families, who "were humane and loved virtue." The argument is evidently fallacious, but part of the antecedent of the major, which is a true syllogism, is false.

DESTRUCTIVE HYPOTHETICAL SYLLOGISM

The **destructive hypothetical syllogism** is of the following general form:

If x is true, then y is true;
but y is untrue;
therefore x is untrue.

This argument is called *modus tollens,* or the mood which denies. Thus: "If perfect justice prevailed on earth, then virtue would receive its reward in this life; but virtue is not compensated for here below; therefore, perfect justice does not prevail on earth."

Voltaire, ridiculing the dictum of Leibniz that "all things are for the best in the best of all possible worlds," prefers to believe in a finite rather than a wicked God. An argument commonly given is: "If God were both omnipotent and good he would moderate the grosser evils in the world; but he does not do this; accordingly, either he is an evil being, or else his power is limited."

FALLACY OF DENIAL OF THE ANTECEDENT

The characteristic fallacy to be noticed in connection with this type of argument is the **fallacy of denial of the antecedent.** We quote from Jevons:

" 'If the study of logic furnished the mind with a multitude of useful facts like the study of other sciences, it would deserve cultivation; but it does not furnish the mind with a multitude of useful facts; therefore it does not deserve cultivation.' This is evidently a fallacious argument because the acquiring of a multitude of useful facts is not the only ground on which the study of a science can be recommended. To correct and exercise the powers of judgment and reasoning is the object for which logic deserves to be cultivated, and the existence of such other purpose is ignored in the above fallacious argument."

A valid argument, of a form more general than the destructive hypothetical syllogism, may be described as follows:

> If x and y are true, then z is true;
> but x is true and z is false;
> therefore, y is false.

Thus we might imagine Horatio to address Hamlet: "If my name is Horatio and I speak truth, it was thy father's ghost."

And Hamlet to reply: "Thy name is Horatio, but 'twas no ghost; ergo, thou speakest falsely."

The corresponding fallacy may be termed the **fallacy of denial of a premise.** A bad argument would result, if one were to reason as follows:

"The Germans may win on land, but if the British navy remains intact, they will not be able to dictate the peace. Therefore, if they win both on land and on sea, they will be able to dictate the peace."

COMPLEX HYPOTHETICAL SYLLOGISM

There is a further form of the hypothetical syllogism, to which attention may be profitably directed, but which is not specifically mentioned, I believe, in the elementary compendiums. We shall term it the **complex hypothetical syllogism.** Its general expression is:

> If x and y are true, then z is true;
> but z is untrue;
> therefore, either x is untrue or y is untrue.

The corresponding fallacy, or the one most commonly to be met with in connection with this argument, will be illustrated by a single example. It consists in interchanging minor and conclusion in the form given above.

"If all Shakespearean scholars are Englishmen and Churchill is a Shakespearean scholar, then Churchill is an Englishman; but either not all

Shakespearean scholars are Englishmen, or Churchill is not a Shakespearean scholar; therefore, Churchill is not an Englishman."

Another case would arise, if we were to infer, because the two premises of a true syllogism are false, that the conclusion is false.

Exercises

Select from the following such as are valid arguments:

1. If a thing can be conceived as nonexistent, its essence does not involve existence; but it is not of the essence of a centaur to exist; therefore, a centaur can be conceived as nonexistent.
2. The world cannot have existed always if it had a beginning in time; but it can have existed always; therefore, it had no beginning in time.
3. There would be no such thing as freedom, if all causation were according to natural law; but human freedom is a fact; therefore, not all causation is in accordance with natural law.
4. Human freedom is meaningless if God is omniscient, for he is then aware of what our decision in any case will be, before we decide; but man *is* a free agent; therefore, it cannot be that God is altogether omniscient.

CHAPTER XII

THE DILEMMA

The **dilemma** is an argument very commonly employed whenever it can be shown that any one of a number of possibilities leads to the same result. We shall introduce our theory of this mode of reasoning with a quotation from Archbishop Whately. It was "urged by the opponents of Don Carlos, the pretender to the Spanish throne; which he claimed as male heir, against his niece the queen, by virtue of the Salic law excluding females; which was established (contrary to the ancient Spanish usage) by a former king of Spain, and was repealed by King Ferdinand. They say 'if a king of Spain has a right to alter the law of succession, Carlos has no claim: and if no king of Spain has that right, Carlos has no claim; but a king of Spain either has or has not such right; therefore (on either supposition) Carlos has no claim.' " It will be a good exercise for the student, when he has finished his reading of this chapter, to undertake to retort this argument.

THE PARADOX OF GORGIAS

Another example is to be found in the contention of the Greek Gorgias that nature does not exist. Thus, if the world had a beginning in time, an in-

finite time must have elapsed before the moment of creation; but an infinite time never can elapse, and hence the moment of creation could never have arrived. Accordingly, the world is *uncreated.* If the world had no beginning in time (*i.e.,* has always existed), an infinite time must have elapsed before the present moment; but this is impossible; we cannot come to the end of something that has no end; therefore, the world must have been *created.*

The fact that time is infinite would have to be established by a separate proof. Thus, if past time were only finite, there must have been a *time* when there was no time (a formal contradiction); and if future time were only finite, there will come a *time* when there is no time (a formal contradiction). Consider the statement: x is both a and not-a, where x is some individual thing or class and a is a property, which it may or may not possess. It is evident that, of classes, the only values of x that will make this a true statement are classes that contain no objects. It will be untrue that triangles are both three-sided and not three-sided, but true that square-triangles are both square and not-square at the same time. Similarly, if x stands for *nothing,* the statement, nothing is both a and not-a, is true. Now, as regards the word, it is forced upon us that it is both *created* and *uncreated;* and since this is true, it is forced upon us that the world is *nothing* (*i.e.,* a nonexistent something).

THE PARADOX OF CORAX AND TISIAS

For the benefit of those who will refuse to consider seriously a philosophical dispute of this sort (and there are many such) we shall furnish an instance related to the experience of daily life. Before there was any science of logic, the Greek sophists (the traveling teachers) taught an art of argumentation, which was often applied practically within the courts of law. We cite the following well-known case from the *Lectures* of Sir William Hamilton: It is known as the *Litigiosus* or *Reciprocus.*

"Of the history of this famous dilemma there are two accounts, the Greek and the Roman. The Roman account is given us by Aulus Gellius, and is there told in relation to an action between Protagoras, the prince of the sophists, and Euathlus, a young man, his disciple. The disciple had covenanted to give his master a large sum to accomplish him as a legal rhetorician; the one half of the sum was paid down, and the other was to be paid on the day when Euathlus should plead and gain his first cause. But when the scholar, after the due course of preparatory instruction, was not in the same hurry to commence pleader as the master to obtain the remainder of his fee, Protagoras brought Euathlus into court and addressed his opponent in the following reasoning: "Learn, most foolish of

young men, that however matters may turn up (whether the decision to-day be in your favor or against you), pay me my demand you must. For if the judgment be against you, I shall obtain the fee by decree of the court, and if in your favor, I shall obtain it in terms of the compact, by which it became due on the very day you gained your first cause. You thus must fail, either by judgment or by stipulation." To this Euathlus rejoined: "Most sapient of masters, learn from your own argument that whatever may be the finding of the court, absolved I must be from any claim by you. For if the decision be favorable, I pay nothing by the sentence of the judges, but if unfavorable, I pay nothing in virtue of the compact, because, though pleading, I shall not have gained my cause." The judges, says Gellius, unable to find a *ratio decidendi,* adjourned the case to an indefinite day, and ultimately left it undetermined. I find a parallel story told, among the Greek writers, by Arsenius, by the Scoliast of Hermogenes, and by Suidas, of the rhetorician Corax (*anglicè* Crow) and his scholar Tisias. In this case, the judges got off by delivering a joke against both parties, instead of a decision in favor of either. We have here, they said, the plaguy egg of a plaguy crow, and from this circumstance is said to have originated the Greek proverb, *κακοῦ κόρακος κακὸν ᾠόν.*"

COMPLEX CONSTRUCTIVE DILEMMA

The **complex constructive dilemma** has the form: If x is true, then y is true, and if z is true, then w is true; but either x is true or z is true; therefore either y is true or w is true.

Our illustrations are taken from Whately. Thus, "If the obedience due from Subjects to Rulers extends to religious worship, the ancient Christians are to be censured for refusing to worship the heathen idols; if the obedience, etc., does not so extend, no man ought to suffer civil penalties on account of his religion; but the obedience, etc., either does so extend, or it does not; hence, either the ancient Christians are to be censured, etc., or else no man ought to suffer civil penalties on account of his religion.

Or, again: "If man is capable of rising, unassisted, from a savage to a civilized state, some instances may be produced of a race of savages having thus civilized themselves; and if man is not capable of this, then the first rudiments of civilization must have originally come from a superhuman instructor; but either man is thus capable, or not; therefore, either some such instance can be produced, or the first rudiments, etc."

COMPLEX DESTRUCTIVE DILEMMA

The **complex destructive dilemma** has the form: If x is true, then y is true, and if z is true, then w

is true; but either y is untrue or w is untrue; therefore, either x is untrue or z is untrue.

Thus: "If this man were wise, he would not speak irreverently of Scripture in jest; and if he were good, he would not do so in earnest; but he does it either in jest or in earnest; therefore, he is either not wise, or not good."

The commonest fallacy to be noticed in connection with the dilemma is the case in which the minor is not a true disjunction—*i.e.*, the case in which the minor does not exhaust all of the possibilities. The conclusion can only be asserted when the premises are true, unless, to be sure, it is true in independence of the argument. We quote from Jevons:

"Dilemmatic arguments are, however, more often fallacious than not, because it is seldom possible to find instances where two alternatives exhaust all the possible cases, unless one of them be the simple negative of the other in accordance with the law of excluded middle. Thus if we were to argue that if a pupil is fond of learning he needs no stimulus, and that if he dislikes learning no stimulus will be of any avail, but as he is either fond of learning or dislikes it, a stimulus is either needless or of no avail, we evidently assume improperly the disjunctive minor premise. Fondness and dislike are not the only two possible alternatives, for there may be some who are neither fond of learning nor dislike it,

and to these a stimulus in the shape of rewards may be desirable."

A dilemma is said to be retorted, whenever an equally cogent dilemma to the contrary effect is produced. The retort of Euathlus to Protagoras is a case in point, and the argument of Gorgias contains two cogent dilemmas in the opposite sense, both of which the arguer accepts as valid. An Athenian mother, according to Aristotle, addressed her son in the following words: "Do not enter into public business, for if you say what is just, men will hate you; and if you say what is unjust, the gods will hate you." To which Aristotle retorts: "I ought to enter into public affairs; for if I say what is just, the gods will love me; and if I say what is unjust, men will love me."

PROOF OF THE DILEMMATIC ARGUMENT

In concluding this chapter we shall establish the formal validity of the dilemmatic argument, basing our proof on the principles which follow, and assuming (as is commonly done) the identity of the implication, *x* is untrue implies *y* is true and the disjunction, either *x* is true or *y* is true.

Principle I.—If antecedent and consequent of a valid implication be contradicted and interchanged, a valid implication will result.

Principle II.—If in any valid implication a factor

in the antecedent be strengthened, or the consequent be weakened, a valid implication will result.

Principle III.—If in any valid implication the same factor be conjoined to both antecedent and consequent, a valid implication will result.

(1) If (major) y is untrue implies x is untrue; and (minor) x is untrue implies z is true; then (conclusion) y is untrue implies z is true.

For (Principle II) the minor allows us to weaken the consequent of the major.

(2) If (antecedent) x is true implies y is true; then (consequent) y is untrue implies x is untrue.

For (Principle I) the antecedent and consequent of the principal antecedent may be contradicted and interchanged.

(3) If (major) x is true implies y is true; and (minor) x is untrue implies z is true; then (conclusion) y is untrue implies z is true.

For the major (1), being the same as the consequent of (2), may be strengthened (Principle II) to the antecedent of (2).

(4) If x is true implies y is true; and z is true implies w is true; and x is untrue implies z is true; then (consequent) y is untrue implies z is true and z is true implies w is true.

For (Principle III) the same factor (z is

true implies w is true) may be conjoined to both antecedent and consequent of (3).

(5) If (major) y is untrue implies z is true; and (minor) z is true implies w is true; then (conclusion) y is untrue implies w is true.
For (Principle II) the minor allows us to weaken the consequent of the major.

(6) If x is true implies y is true; and z is true implies w is true; and x is untrue implies z is true; then y is untrue implies w is true.
For the consequent of (4) being the same as the antecedent of (5) may be weakened (principle II) to the consequent of (5).

(7) If x is true implies y is true; and z is true implies w is true; and either x is true or z is true; then either y is true or w is true.
For we shall assume the right (as is commonly done) to replace the last premise and the conclusion of (6) by the disjunctions that appear in (7).

The result (7) will be recognized as the complex constructive dilemma, which has, accordingly, been derived from the three principles, which we assumed at the outset. The proof is laborious, when expressed without the aid of symbols. In that case the whole derivation could be set forth in a few lines. The proof of the complex destructive dilemma is left as an exercise for the student.

THE DILEMMA

Exercises

Select from the following such as are valid arguments:

1. If this man is a realist, he believes that the order of nature is independent of mind, and if he is an idealist and believes it dependent on mind, he must assume an absolute object; but either he believes it dependent or not; therefore in either case, he must profess belief either in an absolute object or in an absolute order of nature.
2. If a body moves, it must move in the place where it is or in the place where it is not; it cannot move where it is, for then it would not be there, and obviously it cannot move where it is not. Accordingly, its motion is impossible.

CHAPTER XIII

THE SORITES

The **sorites** is of the same form as the syllogism, for its terms are arranged in the same way in a cyclical order, but it is of a more general character. The number of terms is greater than three and, as in the case of immediate inference and syllogism, the number of premises is one less than the number of terms. Because there is sometimes a large number of premises, it will be more convenient to employ in place of the class-symbols, *a, b, c,* etc., the ordinal numbers, *1, 2, 3,* etc.

CONSTRUCTION OF THE VALID MOODS

We shall begin by illustrating the manner of constructing a valid mood of the sorites from a chain of valid syllogisms. Suppose that we were to be given the chain,

A(*21*) and A(*32*) implies A(*31*),
A(*31*) and A(*43*) implies A(*41*),
A(*41*) and A(*54*) implies A(*51*),

and were asked what valid moods of the sorites is thereby implied. It is clear that the major premise of the last syllogism, being the same as the con-

clusion of the second, may be strengthened to A(*31*) and A(*43*). The immediate result of this strengthening is a valid mood of the sorites, *viz.*,

A(*31*) and A(*43*) and A(*54*) implies A(*51*).

The major premise of this last implication may in turn be strengthened to A (*21*) and A (*32*) because of the first syllogism, and we should have

A(*21*) and A(*32*) and A(*43*) and A(*54*) implies A(*51*).

This, then, is the valid mood of the sorites whose truth is implied by the chain of generating syllogisms.

Another method of constructing a valid mood of the sorites from a chain of syllogisms depends upon another principle.

Principle.—If in any valid implication the same factor be conjoined to both antecedent and consequent, a valid implication will result.

Let our chain of syllogisms be

E(*21*) and A(*32*) implies E(*31*),
E(*31*) and I(*34*) implies O(*41*),
O(*41*) and A(*45*) implies O(*51*),

and suppose that we conjoin to antecedent and con-

sequent of the first syllogism the minor premise of the second and so obtain

E(*21*) and A(*32*) and I(*34*) implies
E(*31*) and I(*34*).

The second syllogism allows us to weaken the consequent of this result to O(*41*) and upon carrying out this operation we should obtain

E(*21*) and A(*32*) and I(*34*) implies O(*41*).

Now conjoin to antecedent and consequent of this mood of the sorites the minor premise of the third syllogism, A(*45*)—that is,

E(*21*) and A(*32*) and I(*34*)
and A(*45*) implies O(*41*) and A(*45*),

and weaken the consequent of this implication to O(*51*) by authority of the last member of the chain. Accordingly,

E(*21*) and A(*32*) and I(*34*)
and A(*45*) implies O(*51*),

is the valid mood of the sorites which was to be generated.

THE INVERSE OPERATION

Finally, let us consider the operation which is inverse to the preceding. Suppose, being given a valid mood of the sorites, we should be asked to find

the chain of syllogisms upon which it depends. Let the mood be

A(*12*) and A(*23*) and O(*43*)
and A(*45*) and A(*56*) implies O(*61*).

The premises of the first syllogism of the chain will be the same as the first two premises of the sorites and the minor of the second syllogism will be the same as the third premise of the sorites and so on. The fragment of the chain so far ascertained will be:

A(*12*) and A(*23*) implies
and O(*43*) implies
and A(*45*) implies
and A(*56*) implies

Now the conclusion of the first syllogism, whose premises appear out of the normal order, is evidently A(*13*) and this must be the major of the syllogism which follows. The conclusion of this in turn is determined as O(*41*). If we were to continue this process, each member of the chain in succession would be ambiguously determined as,

A(*12*) and A(*23*) implies A(*13*),
A(*13*) and O(*43*) implies O(*41*),
O(*41*) and A(*45*) implies O(*51*),
O(*51*) and A(*56*) implies O(*61*).

RULES OF THE SORITES

From the considerations that have gone before we conclude that certain valid moods of the sorites can be constructed from chains of valid syllogisms. A complete solution of the sorites would contain a proof that the only valid moods that exist can be built up from chains of valid syllogisms in the manner described. This proof is too advanced for a work of this character. We observe, however, that it depends upon the following truths:

1. If the conclusion is affirmative, then all the premises are affirmative.

2. If the conclusion is negative, then one and only one premise is negative.

3. If the conclusion is universal, then all the premises are universal.

4. If the conclusion is particular, then not more than one premise is particular.

Exercises

1. What valid mood of the sorites can be generated from the following chain of syllogisms?

$$\begin{gathered} A(21) \text{ and } A(32) \text{ implies } A(31), \\ A(31) \text{ and } A(43) \text{ implies } A(41), \\ \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \\ A(n\text{-}1\ 1) \text{ and } A(n\ n\text{-}1) \text{ implies } A(n\ 1). \end{gathered}$$

2. From what chain of valid syllogisms can we build up the sorites,

A(*21*) and A(*32*) and . . .
. . . and A(t t-*1*) and I(t t+*1*) and A(t+ *1* t+*2*) . . .
. . . and A(n-*1* n) implies I(n *1*)?

3. Which one of the rules enunciated at the end of this chapter will establish the invalidity of the sorites,

E(*12*) and E(*23*) and E(*34*) implies E(*41*)?

4. State a rule analogous to one of the rules of the syllogism which will declare to be invalid:

A(*12*) and A(*32*) and A(*43*) implies A(*41*).

CHAPTER XIV

THE VERIFICATION OF THE CLASSICAL SYSTEM

In order that the classical system should hold true in all of its parts, certain characteristic conditions must be satisfied. Besides the moods *Barbara* and *Celarent,* which have been set down as postulates, we should have to have:

(1) Corresponding to each member of the set, A, E, I, O, there is another member of the same set which stands for its contradictory.

(2) Subalternation, A implies I, and E implies O, holds true.

(3) The subject and predicate of E and I alone are simply convertible.

SUPPOSED BREAKDOWN OF THE CLASSICAL SYSTEM

To-day it is all but universally taken for granted that not all these conditions hold for all meanings of the terms, and it is usual to retain the first and last and to assert that the relation of subalternation breaks down. Citations similar to the two set down below might have been selected from any one of a dozen separate authors. Thus Mr. Bertrand Russell remarks:[1] "With our definitions, All S is P

[1] *Introduction to Mathematical Philosophy,* p. 164. London, 1919.

does not imply Some S is P, since the first allows the nonexistence of S and the second does not; thus conversion *per accidens* becomes invalid, and some of the moods of the syllogism are fallacious—*e.g., Darapti:* All M is S, All M is P, therefore Some S is P, which fails if there is no M." Or, to quote from Padoa's exposition of Peano's logic[1]: "The untruth of the traditional moods of the syllogism, by means of which from two *universal* judgments one would deduce a *particular* judgment, has been recognized separately by Miss Ladd (1883), Schröder, Nagy, Peano, etc. It is one of the first and most remarkable results of the adoption of a logical ideography."

In order to understand how this breakdown occurs, the student must become acquainted with what is termed in modern logical theory a *null*-class—that is, a class which contains no objects, or whose value in extension is zero. Thus, the class "square circles" is null and so is the class "fractional integers." The implication,

> All square circles are circles implies
> that some square circles are circles,

is supposed to break down, because the antecedent is taken to be true and the consequent is taken

[1] *"La Logique Déductive,"* etc., *Revue de Métaphysique et de Morale,* vol. 20, p. 67.

to be false; it being commonly assumed that the particular affirmative, some *a* is *b*, is untrue unless members of the *ab* class (what is *a* and *b*) exist.

To consider the case of a syllogism that is supposed to be fallacious let us select the mood *Darapti*,

All square circles are circles,
All square circles are squares,
Some squares are circles,

which appears to be invalid if the premises are taken to be true.

REASON FOR THIS MISAPPREHENSION

This apparent breakdown of the classical system depends, however, upon the fact that the interpretation of the Aristotelian propositions has been too narrowly rendered. Thus, it has seemed altogether natural to the workers in this field to recognize the following identities:

A (*ab*) = *a* is included in *b*,
E (*ab*) = *a* is included in non-*b*,
I (*ab*) = *a* is not included in non-*b*,
O (*ab*) = *a* is not included in *b*.

It will be observed that on this interpretation A and O, and E and I are contradictory pairs. Also it is

true that E and I alone are simply convertible; for, in the first place,

> If *a* is included in non-*b*
> then *b* is included in non-*a*,

is a true statement in the modern Boolean algebra and the corresponding implication holds for the case of I; and, secondly,

> If *a* is included in *b*,
> then *b* is included in *a*,

is untrue, and the same holds for the corresponding case of O.

Subalternation, however, breaks down, for if *a* and *b* are both *null,* and non-*a* and non-*b,* consequently, *universe,* we should have:

> If the members of the null-class are included among the members of the null-class, then the members of the null-class are not contained among the members of the universe.

Here the antecedent is true and the consequent is false, so that subalternation fails, when the terms are taken to represent empty classes.

SOLUTION OF THE DIFFICULTY

We shall now give a rendering of the propositional functions, A, E, I, and O, which not only will verify all of the implications of the classical logic set down in the preceding chapters, but which will accord equally well with the usage of language and with common sense.[1] These somewhat more extended meanings are:

A(ab) = a is included in b **and** a is not null **and** b is not null,
E(ab) = a is included in non-b, **or** a is null **or** b is null.
I(ab) = a is not included in non-b **and** is not null **and** b is not null.
O(ab) = a is not included in b **or** a is null **or** b is null.

If the student will recall what was said in Chapter III of the manner in which a conjunction may be expressed as a disjunction and conversely, he will have no difficulty to verify the fact that A and O, and that E and I are contradictory pairs. Moreover, it will be clear that E and I alone are simply convertible. It will prove a more difficult task for him to verify the relation of subalternation, but he may, perhaps, satisfy himself by considering the case in which the terms are allowed to become null.

[1] Professor Singer has suggested an interpretation of these forms which retains A(aa), but gives up E(aa'). No interpretation will conform *altogether* with common usage.

In the case of *Darapti* he will be able to see that the premises become false when the middle term becomes null and that, consequently, the mood remains valid under all conditions. If the reader happens to be conversant with the modern calculus of classes, and so habitually employs symbols to designate the operations of logic, he will be able easily to verify all of the postulates that have been set down in the chapters that have gone before.

RECONCILIATION WITH COMMON SENSE

The classical logic, therefore, does not break down, as is commonly supposed, but may be taken to hold true in all of its parts. It only remains to be shown that the interpretations of the propositions, A, E, I, and O, which we have given above, are as much in accord with common experience and with common sense as the ones that are ordinarily accepted. Consider the proposition "all *a* is *a*." On our interpretation this will be true for all meanings of *a* except when *a* is null. Thus,

All Athenians are Athenians

means, when expressed in full,

> The members of the class Athenians are included among the members of the class Athenians; and Athenians are not included among non-Athenians."

And this is a true statement.

There are cases, too, in which common sense agrees with the interpretations of the categorical forms that have just been given, and disagrees with those that are commonly recognized. Suppose the proposition:

> Every aged Achilles who is mentioned in the "Iliad" is there celebrated as the swift of foot.

Now, since only one Achilles is mentioned in the "Iliad" and since he died in his youth, the subject of this proposition is a null or an empty class. On the rendering usually given the above statement would be true; on the amended rendering suggested above it would be false, and it is certain that common sense is in agreement with the last interpretation and not with the former.

Again, the assertion, no *a* is non-*a*, is true by both renderings. On the first interpretation it becomes

> Athenians are included among non-non-Athenians,

and, on the second interpretation, it becomes the same with the added condition,

> Or else Athenians is a null-class,

it being allowed to omit this last part from the com-

plete disjunction, because it is (empirically) untrue.

EFFECT ON CONTRAPOSITION AND ON OBVERSION

It is appropriate to mention here some of the transformations that are recognized in traditional logic. The operation of conversion of the terms by *contraposition* as explained before, consists in replacing the terms by their negatives and interchanging them. It is supposed to hold of A and O, but not of E and I. Thus,

All *a* is *b*

is taken to be equivalent to

All non-*b* is non-*a*.

We observe that, except for the meanings *null* and *universe*—that is, for all concrete meanings of the terms but these—contraposition holds in the rendering of A and O which we have given. Thus,

All Athenians are Greeks

becomes as a result of this operation:

> Non-Greeks are included among non-Athenians; and non-Greeks are not Greeks; and non-Athenians are not Athenians,

a statement which is manifestly true, and

Some Greeks are not Athenians

becomes, when converted by contraposition,

> Non-Athenians are not included among non-Greeks; or else non-Greeks are Greeks; or else non-Athenians are Athenians.

the latter parts of the disjunction seeming in common sense rather to reinforce the truth of the part that is first expressed.

Again, except for the meanings *null* and *universe* —that is, for all other meanings of the terms—the identity commonly assumed for "no *a* is *b*" and "all *a* is non-*b*," will hold true. In general it may be observed that the interpretation which we have given of the propositions, A, E, I, and O are identical with the ones that are traditionally offered, for all meanings of the terms except for these limiting values. We conclude, then, that the classical logic may be considered to hold true in all of its parts and that the modern view, that subalternation and some of the valid moods of the syllogism are fallacious, is based upon a misapprehension.

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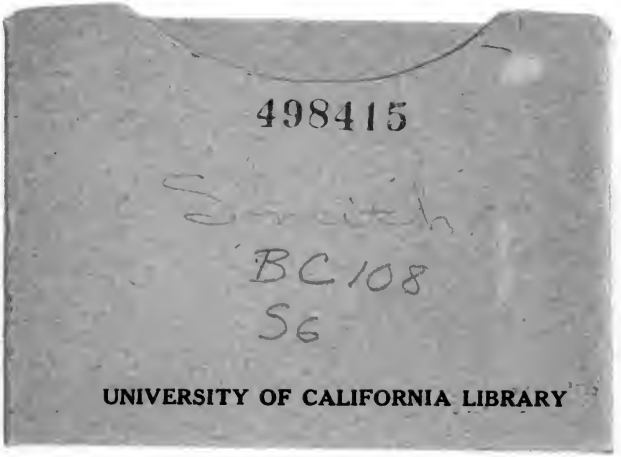

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A. M. D. G.

A BRIEF TEXT-BOOK

OF

LOGIC

AND

MENTAL PHILOSOPHY.

BY

REV. CHARLES COPPENS, S.J.,

Author of "A Practical Introduction to English Rhetoric" and "The Art of Oratorical Composition."

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PREFACE.

THESE pages are a modest contribution towards the accomplishment of an important purpose. They are written in compliance with an earnest desire repeatedly expressed in the solemn utterances of our venerated Supreme Pontiff Leo XIII. "The more active," he says, "the enemies of religion are to teach the unlearned, the young especially, what clouds their intellect and corrupts their morals, the more should you exert yourselves to establish not only a well-adapted and solid method of instruction, but a method in perfect conformity with the Catholic faith, especially as regards Mental Philosophy, on which the right teaching of all the other sciences in a great measure depends—a Philosophy which shall prepare the way for Divine Revelation instead of aiming at its overthrow."

Thus spoke the Holy Father in his Encyclical "Inscrutabili" at the opening of his Pontificate. What this Philosophy should be, he soon after explained in a special Encyclical "On the Higher Studies." It should be the Philosophy of the Schoolmen, the system founded upon the teachings of Aristotle, which was carried to its perfection by St. Thomas in the thirteenth century, and which has held its place in most of the Catholic Colleges and Universities to the present day. "Among the doctors of the Schools," he says, "St. Thomas stands forth by far the first and master of

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all. . . . . To this we must add," the Encyclical continues, "that this Angelic Doctor extended the sphere of his philosophic conclusions and speculations to the very reasons and principles of things, opening out the widest field for study, and containing within themselves the germs of an infinity of truths, an exhaustless mine for future teachers to draw from at the proper time and with rich results. As he used the same intellectual process in refuting error, he succeeded in combating single-handed all the erroneous systems of past ages, and supplied victorious weapons to the champions of truth against the errors which are to crop up in succession to the end of time."

Of this Philosophy there exist many excellent text-books in the Latin, but very few in the English tongue; the present little volume does not attempt to rival their perfection. Its aim is simply: to present to pupils unfamiliar with Latin a brief outline of a sound Philosophy conformable to the teachings of the Schoolmen. It was composed before the excellent Stonyhurst Series of English Manuals of Catholic Philosophy was published; but it is chiefly meant for a different purpose, viz.: for class use in Academies and similar institutions, for which that collection of Manuals is too voluminous, though invaluable as works of reference for professors and pupils. The author sincerely hopes that his modest efforts will contribute to the propagation of sound Philosophic learning.

THE AUTHOR.

DETROIT COLLEGE, August 20, 1891.

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INTRODUCTION.

1. **Philosophy** is the science which investigates the highest causes of all things in as far as they are knowable by reason. That portion of Philosophy which terminates in theory or speculative knowledge is called *Theoretical* or *Mental Philosophy*, or *Metaphysics*. That portion which applies first principles to practice, directing the moral conduct of men, is styled *Practical* or *Moral Philosophy*, or *Ethics*.

2. Since reason is to be our guide in all these investigations, we must begin by examining, (*a*) What process our reason must follow that it may guide us with safety, and (*b*) How far our natural powers of mind can give us unerring certainty. This double task is the scope of **Logic**, which science must first be studied, because it is the foundation of the mental and moral structure. It is as truly a part of Philosophy as the foundation is a part of the building.

3. **Human reason and Divine Revelation** are two means by which truth is manifested to man; they cannot contradict one another: as a matter of fact, that which is evident to reason is never found in conflict with Revelation. Hence arises a precious advantage for the Christian philosopher, of which he were foolish not to avail himself. For, knowing that the path of reason, often difficult to trace correctly, must run parallel to the high road of supernatural Revelation, he will be guarded by the clear and infallible teachings of the

Faith against the vain pursuit of false theories. Thus, Faith, far from enslaving, liberates his intellect from the shackles of ignorance and error. Philosophy looks not for novelties, nor does it aim at originality of thought, but it studies the eternal and unvarying principles of truth.

4. Among the purely human sciences, Philosophy is the **noblest and most important**; for its final purpose is the most exalted, its process the most intellectual, and its teachings secure the foundation of the other sciences. These receive from it their principles, the laws of their investigations, and the ends or purposes to which they should be directed.

PART I.

LOGIC.

5. **Logic** is the science which directs the mind in the attainment of truth. By a **science** we mean the knowledge of things in connection with their causes. Logic is properly called a science, because it considers not only the rules which direct the mind in the attainment of truth, but also the causes or reasons why they do so.

6. It comprises **two parts.** That portion which considers the modes or forms of mental action, and, in particular, the rules to be observed in reasoning or discussing, is called *Formal Logic* or *Dialectics* (διαλέγομαι, I discuss); that portion which studies the matter or truth attained, criticising the reliability of mental action, is *Material Logic*, also styled *Critical* or *Applied Logic.*

BOOK I.

DIALECTICS.

7. In treating of Dialectics, the **main purpose** of a text-book is to teach pupils how to reason correctly themselves, and readily to detect flaws in the false reasonings of others. To this practical purpose we shall almost exclusively confine ourselves. Setting aside, therefore, all other details usually insisted on in works on Formal Logic, we shall here treat of reasoning only, and of a few such preliminary matters as must be understood before the reasoning process itself can be properly explained. We shall therefore treat, in Chapter I., of *simple apprehensions and judgments*, and, in Chapter II., of *reasoning* itself.

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CHAPTER I.

SIMPLE APPREHENSIONS AND JUDGMENTS.

8. We shall consider: 1. *The nature of simple apprehensions.* 2. *The most important distinctions regarding ideas*, and 3. *Judgments*, together with the expression of them in *propositions.*

Article I. The Nature of Simple Apprehensions.

9. **Simple apprehension** is the act of perceiving an object intellectually, without affirming or denying anything concerning it. To *apprehend* is to take hold of a thing as if with the hand; an *apprehension*, as an act of the mind, is an intellectual grasping of an object. The mind cannot take an object physically into itself; but it knows an object by taking it in intellectually, in a manner suited to its own nature, forming to itself an intellectual image, called a *species* of the object. The act of forming this mental image is called a *conception*, and the fruit of it, the image itself, is the *concept*, *idea*, or *notion* of the object. The word *simple* added to apprehension emphasizes the fact that the apprehension neither affirms nor denies the existence of the object; it affirms nothing and denies nothing, it simply conceives the idea of the object.

10. This intellectual image should not be confounded with the sensible image, or **phantasm**, which is a material representation of material objects, and which is formed by the imagination, by means of the material organ of the brain.

The difference between these two images is great, and distinction between them is of vital importance in Philosophy. For instance, I intellectually *conceive* a triangle by apprehending a figure enclosed by three lines and thus having three angles. My notion or idea contains this and nothing more; it is very precise, and every one who conceives a triangle conceives it exactly the same way. But when I *imagine* a triangle, I cannot help imagining it with sensible material accidents, as being of such or such a size and shape, a foot long at one time, a mile long at another. The picture may be vague, various pictures of triangles may be blended together; but it can never be universal, representing all possible triangles, as my idea does. This imagination is a *phantasm.* True, phantasms are often called 'ideas' by English writers; in fact, the whole school of Berkeley, Hume, and their followers fail to trace any difference between them; it is the fundamental error of their pernicious philosophy. Thus, for instance, Huxley maintains that God, the soul of man, etc., are unknowable and unthinkable,* because we can form no phantasm of them. This makes them simply unimaginable, not unknowable nor unthinkable; we know what we mean when we speak of them. (On the difference between ideas and phantasms see, further, *Logic*, by Richard Clarke, S.J., c. vi.)

Our ideas are expressed by words, or *oral terms;* the ideas themselves are often called *mental terms.*

Article II. Distinctions regarding Ideas.

11. Logicians go into much detail on a variety of distinctions with respect to ideas; it will be sufficient for our present purpose briefly to notice a few of them.

* *Essay on Science and Morals.*

A first distinction lies between *abstract* and *concrete* ideas. A **concrete** idea expresses a subject, *e. g.*, 'this gold,' 'some men,' 'all flowers'; or a quality as belonging to a subject, *e. g.*, 'heavy,' 'virtuous,' 'fragrant.' An **abstract** idea expresses a quality by itself, drawn forth, as it were (*abstraho*, I draw away), from the subject to be separately considered, *e. g.*, 'heaviness,' 'virtue,' 'fragrancy.'

12. A second distinction exists between *singular*, *particular*, and *universal* ideas. An idea is **singular** if it expresses a definite single object, *e. g.*, 'this book,' 'that army,' 'that gold,' 'James,' 'the Angel Gabriel,' 'the United States,' meaning this one country.

An idea is **particular** if it represents one or more objects without determining which, *e. g.*, 'a man,' 'an army,' 'a Nero,' 'a spirit,' 'three books,' 'some states.'

An idea is **universal** when it expresses a note or notes common to many objects, found in each of them, no matter how much those objects may differ in other respects; *e. g.*, 'animal' and 'rational' are notes common to all men; they are conceived in the universal idea 'man,' and each of them corresponds to a universal idea. The term *note* designates anything knowable in an object.

13. All universal ideas can be ranked under five heads, called **the five heads of predicables**, because it is always in one of these five ways that a universal idea is predicated of an object.

1. What is apprehended as common to many objects, found in each of them, and therefore predicable of them all in exactly the same sense, may be the whole nature, the essence of those objects, *i. e.*, all that without which those objects cannot exist nor be conceived. For instance, it is the nature or essence of all men to be 'rational animals'; unless I conceive an

object as being both 'rational' and 'animal,' I do not conceive a man at all. This common essence of a class is called a *species*. The **species**, therefore, is defined as all that constitutes the common nature or essence of a class of objects; *e.g.*, 'man,' 'rational animal.'

2. The universal idea may express a part only of the nature common to many objects. Thus, when I conceive 'animal,' I conceive only a part of man's nature, a part found in other species of objects as well, viz., in brutes. 'Rational' is the other part of man's nature, and it is not found in brutes, but it distinguishes man from the brute. Now, that universal concept which seizes upon what is common to different species is the idea of the **genus**; *e.g.*, 'animal' is the genus, to which belong the two species 'man' and 'brute.'
3. On the other hand, the universal concept which expresses the peculiar note by which one species differs from another species of the same genus is styled the **specific difference**; *e.g.*, 'rational' is the specific difference of the species man as distinguished from the species brute.
4. When the concept expresses something that flows or results so necessarily from the very essence that the essence cannot exist without it, and that note never exists but in such an essence, such note is called a **property** or **attribute** of that essence. Thus, 'the power of laughing,' 'the power to express one's thoughts by articulate speech,' cannot be found but in a being that is both animal and rational, and they result as natural consequences from its compound nature. The use of them may be accidentally im-

peded, as is that of reason itself in the infant and the idiot; but they belong to human nature as such, as distinct from other natures, and are therefore properties of man, proper or peculiar to man. Properties need not be conceived in order to apprehend the nature from which they flow; thus, to conceive man, I need not think of his risible power.

5. Lastly, the universal may express what is found in one or many individuals of a class, or even perhaps in all of them, yet in such a way that it could be absent without the individuals' ceasing to be of the same nature. In that case it expresses an **accident** of the species. For instance, a man may be white or black, tall or small, gentle or fierce, young or old, a European or an American; all these are accidental notes of man. All men are larger than ducks; and yet, if a dwarf should be born, who, when full-grown, should not be so large, being nevertheless a rational animal, he would be truly a man, his particular size being only an accident, not a property of his essence.

14. When we conceive a note common to two or more genera, *e.g.*, 'living,' which note belongs to animals and to plants alike, we have then a **higher genus**, of which the former genera may be considered as the species. 'Body' expresses a still higher genus; for it is predicated not only of living but also of non-living substances, such as stones and metals. 'Substance' itself is the **highest genus**, to which not only bodies but also spirits belong.

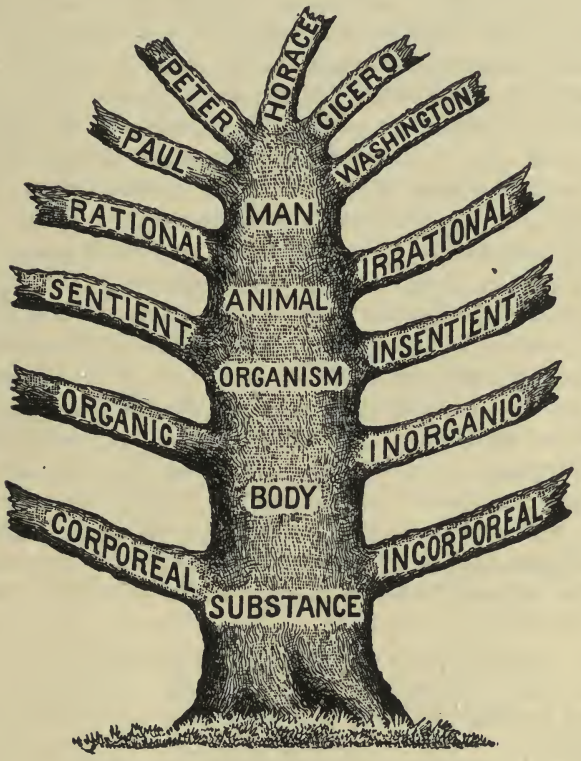
Reversing the process, we may start with the highest genus, say 'substance,' and call 'material' and 'immaterial' substances, or 'body' and 'spirit,' its species. The species 'body' becomes next a **subordinate** genus, of which 'living,' or 'organic,' and 'inorganic' will be the two species. Of

'organisms,' as a new subordinate genus, the species will be 'sentient' and 'non-sentient,' 'animals' and 'plants.' Of 'animals' we have two species, 'rational' and 'irrational,' 'man' and 'brute.' We have various species of 'brutes,' but not of 'man'; for, while brutes have very different natures or essences, and, flowing from these, very different properties, all men have the same essence and the same properties; these differ not in kind but in accidental degrees of perfection. Therefore 'man' is not a genus, but the **lowest species**; 'animal' is his proximate or **lowest genus.** The genera and species between the highest and the lowest are called *subaltern*, *subordinate*, or *intermediate.*

15. This ramification of a highest genus into subaltern genera and species is presented to the eye in the **Porphyrian** tree. The trunk of the tree contains the genera and the species, the branches the specific differences, the top exhibits individuals. (See page 17.)

16. In connection with universal ideas we must explain, as matters of the very highest importance in Logic, the *comprehension* and the *extension* of an idea. **Comprehension** means the total signification, all the notes comprehended or contained in an idea; thus, the concept 'man' comprehends the notes 'animal' and 'rational'; 'animal' itself means 'sentient, living, material substance.'

Extension means the total number of individuals to which the idea extends or applies; the extension of the concept 'man' is all men, that of 'animal' is wider still, extending to all men and all brutes. It is thus apparent that *the greater the comprehension of an idea is, the less is its extension*, and *vice versa;* because the more numerous the qualities apprehended, the fewer the individuals that will possess them all; thus, the genus 'animal' has more extension but less comprehension than the species 'man.' 'Animal' has more



I. e., substance is corporeal or incorporeal; corporeal substance, called matter or body, is organic or inorganic; an organic body or organism is sentient or insentient, etc.

THE PORPHYRIAN TREE.

extension than 'man,' because there are more animals than men; it has less comprehension, because the term 'animal' signifies fewer notes than 'rational animal' or 'man.'

When a term is taken in its full or widest extension, it is said to be **distributed**; it denotes then every one of the objects to which it can apply. Thus, when we say 'all men are creatures,' we mean 'every man is a creature.' Terms expressing particular ideas (No. 12) are **undistributed**; *e. g.*, 'gold is found in California'—*i. e.*, 'some gold.'

A distributed term is applied to all its objects in exactly the same meaning or acceptation. Now, many words are capable of two or three different acceptations: 1. When the meaning of a word is exactly the same, the term is called **univocal**; as when we give the name of 'box' to a case or receptacle of any size or shape. 2. When the meanings are entirely different, without any connection between them, the term is styled **equivocal**; as when the word 'box' is applied, now to a case, then to a blow on the head. 3. When the meanings are different but connected with one another, the term is **analogous**; thus the same word 'box' may stand for a case and for the wood out of which cases used often to be made, the box-tree.

Article III. Judgments and Propositions.

17. A **judgment** may be defined as *an act of the mind affirming or denying the agreement of two objective ideas.* The mind in judging compares two ideas, and consequently the objects represented by those ideas, and affirms or denies that they agree with one another; *e. g.*, 'modesty is praiseworthy,' 'ebriety is not worthy of man.' If, as in these examples, the agreement or disagreement is seen to exist by the mere consideration or analysis of the ideas compared, the judgment is **analytic**; it is also styled *a priori, i. e.*,

formed antecedently to experience; or *pure, i. e.*, formed by pure reason, not learned by sense-perception; or again, it may be called *necessary*, *absolute*, or *metaphysical*, according to the obvious meanings of those terms. But if the agreement or disagreement is discovered consequently on experience, *e. g.*, 'gold is malleable,' the judgment receives the opposite appellations of **synthetic**, *a posteriori*, *experimental*, *contingent*, *conditional*, and *physical*.

18. If a judgment of either kind is arrived at by reasoning, it is **mediately evident**; if the agreement or disagreement is seen without the aid of reasoning, the judgment is **immediately evident**. That 'ice is cold,' is an immediate *a posteriori* judgment; that 'there is nothing without a reason for it,' is immediately known *a priori*; that 'the sum of the angles of a triangle is equal to two right angles,' is known mediately *a priori*; the physical laws are known mediately *a posteriori*.

19. A judgment expressed in words is called a **proposition**. The subject and predicate together are its **matter**, and the affirmation or negation its **form**; the **copula** is always the verb 'to be' in the present indicative, expressed or implied: 'I see' is equivalent to 'I am seeing,' 'He said' to 'He is one who said,' etc.

That a proposition be **negative**, it is necessary that a negative word affect the copula. Now, it often requires some reflection to see what word is intended to be affected by the negation: 'No criminal is a happy man' means 'A criminal *is not* a happy man'; 'A tyrant has no peace' means 'A tyrant *is not* one having peace.'

20. In propositions it is of the highest importance for correct reasoning that we carefully attend to the *extension* and the *comprehension* of the terms used and of the ideas for which they stand.

I. If we consider **the extension of the subject**, a proposition is styled *singular*, *particular*, or *universal*, according as its subject expresses a singular, particular, or universal idea (No. 12). The form of the term expressing that idea may be misleading, the meaning must be carefully considered. Thus, 'a man is a creature,' 'man is a creature,' 'all men are creatures,' 'every man is a creature,' 'no man is necessary,' are all universal propositions; while 'a man was slain' is particular (for here 'a man' means, not every man, but 'some one man'), and 'that man is generous' is a singular proposition.

II. If we consider **the extension and the comprehension of the predicate**, we have the following rules:

1. *In an affirmative proposition the predicate is taken in its full comprehension, but not* (*except in definitions*) *in its full extension.* For instance, 'gold is a metal' means that gold has all the notes constituting a metal, but not that it is every metal. We say 'except in definitions,' for in these the defining words, which are the predicate, must have the same extension as the thing defined, expressed in the subject; *e. g.*, 'man is a rational animal,' *i. e.*, 'any rational animal.'
2. *In a negative proposition the reverse holds true, i. e., the predicate is taken in its full extension, but not in its full comprehension.* For instance, 'a diamond is not a metal' denies that the diamond is contained in the whole class of metals; but it does not deny that it has qualities in common with metals, since it is a substance, material, lustrous, etc., as well as metals. The extension of the subject determines the **quantity** of a proposition; its **quality** depends on its form, *i. e.*, on its being affirmative or negative.

21. In reasoning we must distinguish between *hypothetical* and *categorical* propositions.

The **hypothetical** proposition does not affirm or deny the agreement of subject and predicate absolutely, but dependently on some supposition or condition, or with a possible alternative. It is distinguished from the **categorical,** which directly affirms or denies the agreement between a subject and a predicate without any condition or alternative.

The hypothetical may be of *three kinds:*

(*a*) The **conditional,** consisting of two parts, one of which is declared to be the condition of the other. The part expressing the condition is called the *condition* or *antecedent,* the other the *conditioned* or *consequent.* If the connection is true, the proposition is true. Thus, 'If you knew God well, you would love him,' is certainly true; 'If you get old, you will be wise,' may be false.

(*b*) The **disjunctive,** which connects incompatible clauses by the disjunctive particle 'or'; as, 'A being is either created or uncreated.' The proposition is true, if it leaves no alternative unmentioned.

(*c*) The **conjunctive,** which denies that two things can exist, or hold true, at the same time; as, 'A being cannot be created and independent.'

CHAPTER II.

REASONING.

22. **Reasoning** is the mental act or process of deriving judgments, called conclusions, from other judgments, called premises.

The principle underlying all valid reasoning is that the conclusion is implicitly contained in the premises; therefore whoever grants the truth of the premises thereby really grants the truth of the conclusion. For instance, in this reasoning, "Every good son is pleased to see his mother honored; but Christ is a good Son; therefore He is pleased to see His Mother honored," whoever grants the first two propositions must grant the third, since it is contained in them.

Reasoning is styled *pure*, if the judgments are analytic judgments; *empiric*, if they are synthetic, and *mixed*, if one premise is analytic and the other synthetic. Reasoning expressed in words is called **argumentation.**

Article I. The Categorical Syllogism.

23. All argumentation may be reduced to the *categorical syllogism*. A **syllogism** is an argument consisting of three propositions so connected that from the first two the third follows. If all the propositions are categorical, the syllogism is categorical. It will be remembered that a proposition is called **categorical** if it affirms or denies absolutely the agreement of a subject with a predicate. (No. 21.) "All virtues are desirable; but sobriety is a virtue; therefore sobriety is

desirable," is a categorical syllogism. This conclusion, "Sobriety is desirable," is implicitly contained in the first or major premise, "All virtue is desirable"; and the second or minor premise, "Sobriety is a virtue," points out the fact that it is therein contained. Such reasoning is, therefore, perfectly valid.

§ 1. *Constructing Syllogisms.*

24. **To prove a thesis by a syllogism** we begin by finding a proposition which really involves the truth of the thesis, and in a second proposition we state that it does so. Thus, if I am to prove that every one must honor his father and mother, I may start with the premise, "Every one must do what God commands"; I add the minor premise, "But God commands to honor father and mother." Hence I legitimately draw the conclusion, "Therefore every one must honor his father and mother."

25. We must next examine in what ways premises may contain conclusions. **If the major is a universal proposition, it may contain the conclusion in four different ways:**

1. The proposition being universal, the subject is distributed or taken in its widest extension; thus, "Every stone is matter," means that the predicate 'matter' applies to everything that is a 'stone.' If, therefore, the minor states that something, say 'marble,' is a stone, the conclusion will follow that marble is matter. Thus *the major affirms that a predicate belongs to a whole class; the minor affirms that a certain thing is of that class; the conclusion affirms that the same predicate belongs to that certain thing.*
2. Similarly, if the major is negative, as, "A stone is not a spirit," and the minor declares that "Marble is a stone of some kind," the conclusion will be that "Marble is not a spirit." That is: *the major*

denies a predicate of a whole class; the minor affirms that a certain being is of that class; the conclusion denies that same predicate of that same being.

3. A third form reasons thus: *The major denies a predicate of a whole class; the minor affirms that a certain being has that predicate; the conclusion denies that said being is of said class;* for if it were of that class, it would not have that predicate. Thus, "A stone is not a spirit; but an Angel is a spirit; therefore an Angel is not a stone."
4. In the three cases just explained the minor is affirmative. A fourth form of syllogism arises if *the major affirms some predicate of a whole class, and the minor denies that a certain being has that predicate; the conclusion will then be that said being does not belong to said class;* since all the individuals of that class have been affirmed to possess that predicate. "Every stone is matter; an Angel is not matter; therefore an Angel is not a stone."

In these four forms the major is a universal proposition, and the reasoning is founded upon the wide extension of the subject. The major need not be universal in the **fifth form,** which derives its validity from the full **comprehension of the predicate.**

5. The fifth form reasons thus: *The major affirms that a being has a certain predicate, i. e.,* that it has all the notes comprehended in that predicate; *the minor affirms that a certain note is comprehended in that predicate; the conclusion affirms that said being has said note.* Thus, "This stone is matter; but all matter is extended; therefore this stone is extended." By changing the order of the premises, this fifth form is reducible to the first.

26. The **first and second of these five forms** are the most obvious modes of argumentation and the most constantly used. The reasoning so familiar in Mathematics, A=B, B=C, ∴ A=C, is an application of the first form. The argument, if expressed in full, would read thus: "Any two things equal to a third thing are equal to each other; but A and C are equal to a third, B; therefore they are equal to each other." Similarly, from the second form we have the following reasoning: "Two things, one of which is equal to a third thing and the other unequal, are not equal to each other; but A is equal to B, and C is not equal to B; therefore A is not equal to C.

27. In these two special modes of reasoning the major propositions are usually suppressed, because they are so obvious; and the arguments assume an **abridged form,** so constantly in use and so practically useful, that we must explain it with special care. In fact, many logicians reduce all syllogisms to these two abridged forms, which they call the *affirmative* and the *negative syllogism.*

28. The **affirmative syllogism,** *i. e.*, that in which both the premises are affirmative, is based on the principle that *two things equal to a third are equal to each other:* A=B, B=C; therefore A=C

The **negative syllogism,** *i. e.*, that in which one premise is negative, is based on the principle that *two things, one of which is equal and the other unequal to a third, are unequal to each other:* A=B; B is not equal to C; therefore A is not equal to C.

29. The purpose of comparing A with B, and B with C, in the premises is to bring A and C together in the conclusion, as equal or unequal to each other. A and C are to be brought together; they are therefore called the **extreme terms,** and B, which brings them together, is **the middle**

term. The subject of the conclusion is styled the *minor extreme;* its predicate, the *major extreme.* The premise containing the major extreme is the *major premise,* and that containing the minor extreme is the *minor premise;* still, practically the first expressed is usually called the major, and the second the minor premise. All the propositions together are the **matter** of the syllogism; the proper connection between them is its **form** or **sequence,** a term not to be confounded with consequent or conclusion.

30. **A syllogism is valid** when both the matter and the form are without a flaw. The following is materially true, formally false: "All virtue is good; intemperance is not a virtue; therefore intemperance is not good." The following is materially false, formally true: "Gloomy things are hateful; but virtue is a gloomy thing; therefore virtue is hateful."*

§ 2. *Criticising Syllogisms.*

31. In the mathematical formula, A=B, B=C, ∴A=C, there is no danger of error; but when we substitute ideas for the letters, there is need of great care to avoid mistakes. Thus, suppose that for A I substitute "silver," for B "a certain metal," for C "yellow," and instead of the formulas, A=B, B=C, ∴ A=C I write: "Silver is a certain metal; but a certain metal is yellow; therefore silver is yellow," the conclusion is not legitimate; for 'a certain metal' is taken in two different significations, and consequently 'silver' and 'yellow' are not compared to one thing, but to different things. To

*Exercises like the following will be found to be of great advantage: Construct syllogisms proving the following theses: The Saints deserve to be honored, No man is to be hated by his fellow-man, Theft should be punished, Good books are valuable treasures, Bad books are injurious, Riches are not lasting possessions, The study of music should be encouraged, Jealousy cannot please God, No time is useless.

avoid and to discover errors in syllogistic reasoning, the following **eight rules** must be applied:

1. The terms are only three, to this attend;
2. Nor let the consequent a term extend.
3. Conclusions ne'er the middle term admit;
4. At least one premise must distribute it.
5. Two negatives no consequent can show,
6. From affirmations no negations flow.
7. A universal premise you'll provide,
8. And let conclusions take the weaker side.

32. *Rule* 1. *The terms are only three, to this attend.* There must be three terms, representing three ideas, and only three terms and ideas; this is the most important rule of all: it virtually contains most of the other rules. We evidently need three terms, that two things may be compared with a third; and, as each term must occur twice, there is no room for a fourth term. This rule is often violated by using one of the terms in two different meanings, especially the middle term; as:

Chewing is a bad habit;
But *chewing* is necessary to man;
Therefore a bad habit is necessary to man.

Rule 2. *Nor let the consequent a term extend.* Let no term have a wider meaning in the conclusion than in the premises; else there would really be more in the conclusion than is contained in the premises; as:

You are not what I am;
I am a *man;*
Therefore you are not a *man.*

'A man' is distributed in the consequent; for it stands for 'any man at all,' 'you are not any man at all'; but 'man' is particular in the minor; it means 'a certain man,' 'some man.'

Rule 3. *Conclusions ne'er the middle term admit.* This rule is evident, as the conclusion has nothing to do but to compare the extremes. We could not argue:

> Lincoln was President;
> Lincoln was of Illinois;
> Therefore *Lincoln* was President of Illinois.

Rule 4. *At least one premise must distribute it.* The middle term must be used in its widest meaning in at least one of the premises. If the middle term were taken twice in a particular meaning, it might denote different objects; as:

> *Some monks* were very learned;
> Luther was a *monk;*
> Therefore Luther was very learned.

Notice that a *singular term* is taken in its widest meaning, as 'Cicero,' 'Columbus,' 'the Eternal City,' etc.; *e. g.*, "Columbus discovered America; but Columbus was disgraced; therefore the discoverer of America was disgraced."

Rule 5. *Two negatives no consequent can show.* From the fact that two things are not equal to a third, it does not follow that they are equal to each other, nor that they are unequal.

Rule 6. *From affirmations no negations flow.* If the two premises are affirmative, they declare that two things are equal to a third; whence it follows that they are equal, not unequal, to each other.

Rule 7. *A universal premise you'll provide.* If both premises are particular, no conclusion will follow. For their subjects are particular (No. 20), and if both are affirmative, their predicates are particular (No. 20); thus all their terms are particular, and the middle term is not distributed as it should be by Rule 4. If one is negative, its predicate is distributed (No. 20), but that is not enough; we need then

two universal terms, one for the middle term and one for the predicate of the conclusion. For that conclusion will be negative (Rule 8), and therefore must have a universal predicate (No. 20). We cannot reason thus:

> Some Inquisitors were cruel;
> Some good men were Inquisitors;
> Therefore some good men were cruel.

Rule 8. *And let conclusions take the weaker side.* The meaning is that, if one of the premises is negative, the conclusion is negative; if one is particular, the conclusion is particular. The first assertion is evident: it regards the negative syllogism explained above (No. 28). As to the second, if one premise is particular, two cases may occur: 1. If both are affirmative, they can contain only one distributed term, since one subject and both predicates are particular. The distributed term must, of course, be their middle term, for the middle term must be at least once distributed; and therefore the subject of the conclusion must be particular. 2. If one premise is negative, there may be two distributed terms in the premises, viz., the subject of the universal proposition, and the predicate of the negative—one of these is needed for the middle term, and one for the predicate of the negative conclusion; thus the subject of the conclusion will again be particular.*

33. These same rules apply to all syllogisms having

* **Exercise.** Criticise the following syllogisms:

1. "The beings conjured up by spiritists are spirits;
   But the souls of the dead are spirits;
   Therefore the beings conjured up by spiritists are the souls of the dead."
2. "Blessed are the poor in spirit;
   The Apostles are blessed;
   Therefore the Apostles are poor in spirit."
3. "Scientists deal with physical laws;
   But Huxley and Darwin are scientists;
   Therefore they deal with nothing but physical laws."

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categorical premises, even though the premises be **compound** propositions. The rules may seem at first sight to be violated, but they will be found, on careful inspection, to be observed in all correct reasoning of this kind. Attend especially to that part of the compound premises in which the stress of the argument lies. Thus, when we say, "God alone is *eternal*, but Angels are not God; therefore they are not *eternal*," the term 'eternal' is distributed in the conclusion, while it seems to be the predicate of an affirmative proposition in the major premise. But the major is compound, and contains a negative part, "Whatever is not God is not eternal." Hence the rule is not violated.

Article II. The Hypothetical Syllogism.

34. **A hypothetical syllogism** is one whose major is a hypothetical proposition (No. 21); and such it always is when the syllogism is not categorical. We have seen that there are three kinds of hypothetical propositions: the *conditional*, the *disjunctive*, and the *conjunctive*. Hence there are three species of hypothetical syllogisms.

35. I. **Conditional** syllogisms derive their force from an affirmed connection between a condition and a consequent; so that, if a certain condition is verified, a certain consequent must be admitted. Therefore, if the consequent does not exist, the condition is thereby known not to be verified. Hence this argument may validly conclude in two ways:

4. "Monopolists are rich;
Some rich men are proud;
Therefore monopolists are proud."

5. "Many men are rich:
Many men oppress the poor;
Therefore the rich oppress the poor."

6. "The free-traders wish to reduce the tariff;
Mr. C. wishes to reduce the tariff:
Therefore Mr. C. is a free-trader."

1. *Affirmatively: The condition being affirmed, the consequent must be affirmed;* but not *vice versa.* Thus we say rightly:

> "If the sun shines, it is day;
> But the sun shines;
> Therefore it is day."

But if the minor were "It is day," it would not follow that the sun shines. Or, 2. *Negatively: The consequent being denied, the condition must be denied;* but not *vice versa.*

> "If the sun shines, it is day;
> But it is not day;
> Therefore the sun does not shine."

If the minor were "The sun does not shine," it would not follow that it is not day.

These and all other conditional syllogisms can be reduced to the categorical form. For instance, we can reason thus:

> "All times of sunshine are day;
> But this is a time of sunshine;
> Therefore it is day."

36. II. The **disjunctive** syllogism has a disjunctive major premise; *e. g.*, "Either the father, or the mother, or the child is the natural head of the family." It is supposed that the disjunction is complete, *i. e.*, that no fourth alternative is possible. From this major we may reason in three ways:

1. *The minor may deny one member of the disjunction, and the conclusion affirm the other members disjunctively.*

> "But the child is not the natural head of the family;
> Therefore either the father or the mother is such."

2. *The minor may affirm one of the members, the conclusion deny the other members copulatively:*

> "But the father is the natural head;
> Therefore neither the mother nor the child is such."

3. *The minor may deny all the members but one, the conclusion affirm that one:*

"But the mother and the child are not;
Therefore the father is."

37. III. The **conjunctive** syllogism has a conjunctive major premise; as: "No one can love God and hate his neighbor." From this premise we can reason validly by affirming one of the incompatible predicates in the minor, and denying the other in the conclusion: "But the Martyrs loved God; therefore they did not hate their neighbor," or "But Nero hated his neighbor, therefore he did not love God."

Article III. Other Species of Demonstrative Arguments.

38. 1. The **Enthymeme**, as now usually understood,* is an elliptical syllogism, one of the premises being understood (ἐν θυμῷ, in the mind); *e. g.*, "The world displays a wonderful adaptation of means to an end; therefore it is the work of an intelligent Maker." The major is understood, viz., "Whatever displays a wonderful adaptation of means to an end is the work of an intelligent maker." To **criticise** the validity of an enthymeme we have only to supply the omitted premise, and then apply the ordinary rules of the syllogism.

39. 2. The **sorites** (σωρός, a heap) is an abridged series of syllogisms; it is an argument consisting of more than three propositions so connected that the predicate of the first becomes the subject of the second, the predicate of the second the subject of the third, etc., till the conclusion joins the subject of the first with the predicate of the last premise. "Man is accountable; whoever is accountable is free; whoever is free is intelligent; whoever is intelligent cannot be mere matter; therefore man cannot be mere matter."

* The word was differently derived and explained by Aristotle.

40. **To test such reasoning,** it should be resolved into connected syllogisms, thus:

"Whoever is accountable is free; but man is accountable; therefore man is free."

"Whoever is free is intelligent; but man is free; therefore man is intelligent."

"Whoever is intelligent cannot be mere matter; but man is intelligent; therefore man cannot be mere matter."

41. 3. The **dilemma** (δις-λῆμμα, a twofold assumption) is an argument which offers an adversary the choice between two or more alternatives, from each of which a conclusion is drawn against his position. The alternatives are called the *horns* of the dilemma. Such was the reasoning of one whom a Protestant parent was preventing from becoming a Catholic. He answered: "Either Protestantism or Catholicity is right. If Protestantism is right, every one must be guided by his own judgment in religious matters, and you should not prevent me from judging for myself. If Catholicity is right, you ought not only not to prevent me, but even to follow my example."

42. To be **conclusive,** the dilemma must leave no escape from the alternatives presented; thus, the dilemma just quoted would not be conclusive against a Pagan; for he would deny the major. Besides, the partial inferences must follow strictly from their respective premises; else the argument may often be retorted. A young man, striving to dissuade his sister from devoting herself to the exclusive pursuit of holiness, argued thus: "Either you have still a long or but a short life before you: if a long life, you will forego countless pleasures; if a short life, you cannot get far on the path of holiness." She retorted: "If a short life, I shall forego few pleasures; if a long one, I can get far on the path of holiness."

43. 4. When proofs of the premises or of one of them are inserted in a syllogism, the argument is called an **epichirema** (ἐπὶ χείρ, at hand, ready for use), which is rather an oratorical form of the syllogism than a distinct species of reasoning; *e. g.*, "Education should promote morality; but it fails to do so when severed from religious teachings, since morality derives all its force from religious convictions; therefore education should be religious."

44. 5. **Induction** requires careful consideration, on account of its constant application to the Physical Sciences. It follows a process the reverse of the syllogistic; for it argues not from universals to particulars, but from particulars to universals. It may be defined as an argument in which we conclude that what is found by experience to hold true of single objects of a class holds true of the whole class. Induction may be *complete* or *incomplete*.

45. **Complete induction** examines every single object of a class, and then enunciates universally that all the class has certain properties; for instance, after exploring every zone of the earth, we may conclude, "All the zones of the earth's surface are capable of supporting human life." Complete induction rests for its validity on this **syllogism**: "Whatever is true of every individual of a class is true of the whole class; but a certain proposition is true of every individual of a class; therefore it may be predicated of the whole class."

46. **Incomplete induction,** the ordinary process of Physical studies, does not examine every single object of a class, but a sufficient number of such objects, and under sufficiently varied circumstances, to make it certain that the property or action observed cannot be owing to any accidental cause, but must be due to the very nature of the objects, and therefore must always accompany them, even in such cases as have not been examined. As long as any doubt remains whether, perhaps,

the peculiarity constantly observed may not be owing to some accidental circumstances, induction cannot give truly scientific certainty; but when all such doubt is excluded, the argument is conclusive. It rests then upon this clear **syllogistic reasoning**: "Whatever property or action flows from the very nature of objects must always accompany those objects; but a certain property or action is known by a sufficient variety of experiments to flow from the very nature of certain objects; therefore it must always accompany them." For instance, heavy bodies when left unsupported have been found in most varied circumstances to fall to the earth, and therefore we judge without fear of error that this tendency must be due to their very nature, and we formulate the natural law: "Heavy bodies when unsupported fall to the earth."

47. The only **danger** is that scientists, in their eagerness to formulate general laws, will not always examine a sufficient variety of cases to exclude all doubt as to the real cause of the phenomena observed. Thus, Laplace laid it down as a natural law that all the parts of the solar system revolve from west to east; while it is now known that some of the solar planets and their satellites perform motions in the opposite direction.

48. It is evident that no conclusion is **valid**, except in as far as it is contained in the premises from which it is derived. Therefore the fact that an assertion is found to hold in ninety-nine cases is no certain proof that it will hold true in the hundredth case, since this hundredth case is not contained in the cases observed. Incomplete induction, therefore, cannot by itself, without resting on a syllogism, furnish a scientific proof. But we have scientific proofs of many things. Hence it is evident that Materialists and Positivists (*i. e.*, those pretended philosophers who admit nothing but matter and sensible phenomena) are entirely mistaken when they teach that the

mind has no knowledge of any universal propositions whatever, except as far as it has observed and generalized individual facts; that all reasoning, therefore, is only the generalizing of facts, or that all the elements of our knowledge are only inductive, without any universal proposition on which their certainty rests. Some of these philosophers maintain that we do not even know that a circle must be round, but only that it is always known to be so on this earth, while elsewhere it may, for all we know, be square. But the proposition, "A circle is round," is self-evident, independently of observation and induction. A system is known to be false if it leads logically to absurd consequences, as their system does.

Article IV. Probable Reasoning.

49. In all the forms of argumentation so far explained, the process is every way reliable and the conclusion certain; such reasoning is called **demonstrative**; to distinguish it from **probable** reasoning, which fails to remove all prudent fear of error.

A syllogism one or both of whose premises are only probable will, of course, yield only a probable conclusion; it is called **dialectic**, *i. e.*, open to discussion (*διαλέγομαι*, I discuss). We shall here consider two important species of probable arguments, *Analogy* and *Hypothesis*, both of frequent application, chiefly in the Physical Sciences.

50. I. **Analogy** (*ἀνάλογος*, parallel reasoning) is an argument by which we conclude that a certain line of reasoning will hold in one case because it is known to hold in a similar case. Thus, because we see that the actions of brutes are to a great extent similar to those of men, and in men they are prompted by certain feelings, we conclude, with very strong probability, that in brutes also they are prompted by similar feelings.

51. **The principles underlying analogical reasonings** are such as these: "Similar causes are apt to produce similar effects," "Similar properties suggest similar essences," "Things similarly constructed appear to be governed by similar laws," etc. Sometimes the probability thus obtained is very strong; at other times the argument is deceptive, because, though alike in many other ways, the two cases may differ on the very point in question. Such are many of the analogies urged in support of the Evolution of Species. "The vile grub is evolved into a beautiful butterfly; why may not a hawk be developed into an eagle?" asks the popular scientist. But from the egg of the butterfly comes the vile grub again, and the species remains ever the same. Varieties of type within the same species of animals are numberless, but no single case of an evolution from one species into another has ever been scientifically established.

52. The argument of analogy is more **useful** to the orator than to the philosopher. It supplies the former with the topics of Similitude and Example. It suggests much effective reasoning *a majori*, *a minori*, and *a pari*.

In scientific investigations analogy is often suggestive of solutions, which may afterwards be proved demonstratively to be correct; till they are so proved, they are called *hypotheses*.

53. II. An **hypothesis** (ὑπόθεσις, a supposition) is a proposition provisionally assumed as if true, because it accounts plausibly for many facts. For instance, it was formerly supposed that light consisted of particles emitted by luminous bodies; the present hypothesis explains the phenomena of light more plausibly by the vibrations or undulations of ether. When an hypothesis is so far confirmed by experience that it leaves no reasonable doubt as to its correctness, it ceases to be an hypothesis and becomes a *thesis*.

That an hypothesis may be probable and truly **scientific**,

it is necessary: 1. That it explain a considerable portion of the facts in question. 2. That it do not certainly contradict any well-established truth; for, as two contradictories cannot both be true, whatever hypothesis contravenes a well-established truth is thereby known to be false. Numerous important discoveries have been made, especially in the Physical Sciences, by means of ingenious hypotheses. On the other hand, science has often been much retarded by false hypotheses, which led investigations into wrong directions. To point out such false assumptions is to render most important services to the cause of progress. For one Copernican theory retarded a while till supported by stronger proofs, numerous wild vagaries have been discountenanced by the Roman tribunals, and the energies of the learned diverted from wasting themselves in the pursuit of idle fancies.

Article V. Indirect Reasoning.

54. Reasoning, whether demonstrative or probable, is styled **indirect** when, instead of proving the thesis, it simply aims at clearing away objections against it, or at establishing some other proposition from which the truth of the thesis may be inferred. Indirect reasoning may assume various forms:

1. The **self-contradiction**, or *reductio ad absurdum*, is a form of argument showing that the denial of the theses leads to absurd consequences; thus we argue the necessity of admitting certainty from the fact that the denial of all certainty leads a man to stultify himself.
2. The **negative argument** points out the absence of all proof from an opponent's assertions. "Mere assertions go for nothing," "*Quod gratis asseritur gratis negatur*," are received axioms of discussion.
3. The **instance** or **example** adduces a test case in

which the assertion or the reasoning of an opponent is shown to be at fault. Thus, if one asserted that all history is unreliable, we might instance our Declaration of Independence as an undeniable fact of history.

4. An **argumentum ad hominem** draws from an opponent's principles, true or false, a conclusion against him; *e. g.*, when a Fatalist philosopher was about to flog his slave for the crime of theft, the latter argued that he could not be justly punished for a crime which he was *fated* to commit.
5. A **retort** turns an adversary's argument or some portion of it against himself; as when the same philosopher answered that he likewise was *fated* to flog the slave.
6. We **evade** an argument when, without discussing his proofs, we call on an adversary to explain what he is unwilling or unable to explain; thus many a specious theorizer is silenced by summoning him to explain the consequences of his theories.
7. The argument **ad ignorantiam** shows that an opponent is unable to prove his point or answer our objections.
8. The argument **ad invidiam** makes an adversary's thesis or his proofs odious or ridiculous.

55. In **answering objections** we should attend with special care to distinguish what is true from what is false in the arguments of our opponents.

Most objections contain some element of truth; for falsity, as such, is not plausible: it is the truth blended with falsity that gives plausibility to an objection. To separate the one from the other, by drawing clear lines of demarcation, is the keenest test of logical skill, and the direct road to complete victory. To facilitate for the student this task of neatly dis-

tinguishing the true from the false, we shall now point out the chief forms which fallacious arguments are apt to assume.

Article VI. Sophisms or Fallacies.

56. A **sophism** or **fallacy** is an argument which, under the specious appearance of truth, leads to a false conclusion. The deception is caused either by some *ambiguity in the expression*, or by some *confusion in the thoughts expressed.*

57. I. The fallacies arising from **ambiguity in the expression** are chiefly two:

1. The **equivocation,** or **ambiguous middle,** uses a middle term in two different meanings; *e. g.*, "The soul is immortal; but a brute animal has a soul; therefore a brute animal has something immortal." We answer by distinguishing the two meanings of the word 'soul.' In the major it denotes the human soul, in the minor the principle of life in any animal: there are four terms.
2. The fallacy of **composition and division** confounds what holds of things separate with what holds of them united; *e. g.*, "It is absolutely impossible that the dead should live" is true in the sense that they cannot live and be dead at the same time, *i. e.*, in the sense of *composition;* but it is not true in the sense of *division:* those now dead can, by the power of God, be made to live again.

58. II. Fallacies result from **confusion of thought** in six ways, chiefly:

1. The fallacy of the **accident** confounds an essential with an accidental property; *e. g.*, "We buy raw meat, and we eat what we buy; therefore we eat raw meat."

What we eat has the same essence as what we buy, but not the same accident of rawness.

2. What is true in the proper sense of the word, '*simpliciter*,' is often confounded with what is true in a qualified sense or **under a certain respect** (*secundum quid*); *e. g.*, "A sea-captain who willingly throws his cargo overboard ought to indemnify the owner; but A did so; hence A ought to indemnify the owner." The major would be true, if the captain were absolutely willing to destroy the cargo entrusted to him; but not if he is willing in a way only, *i. e.*, as a necessary means to save vessel and crew.

3. An **irrelevant conclusion,** *ignoratio elenchi*, or *missing the point*, proves what is not in question, refutes what is not objected; as when Evolutionists prove elaborately that the body of man resembles in various ways the bodies of brutes—a fact which no sensible man denies.

4. The *petitio principii*, or **begging the question,** consists in taking for granted the point which is to be proved; when this very point is used as a premise in the reasoning, the fallacy is called a **vicious circle.**

5. The fallacy of the **false consequence,** often called a *non-sequitur*, or want of sequence, is used when a conclusion is drawn which is not contained in the premises; *e. g.*, "There exists a wonderful gradation in the perfection of plants and animals; therefore the more perfect are evolved from the less perfect."

6. The **undue assumption,** or false cause, *non causa pro causa*, assumes as a cause what is not a cause; as when the Reformation is assumed to be the cause of scientific progress. This fallacy often arises from

the fact that mere priority in time is mistaken for causality; *post hoc; ergo propter hoc.**

Article VII. Method in Reasoning.

59. **Order** is a proper arrangement of parts for any purpose whatever, theoretical or practical; **method** is a suitable arrangement of parts with a view to a practical end. In reasoning, the end is the acquisition or the communication of knowledge.

60. All reasoning must **begin with undoubted premises,** which themselves need not to be supported by reasoning: no science is expected to prove its first principles. Thus, Geometry starts out with a number of axioms, from which the whole science is derived by logical reasoning. Such axioms are not blindly or arbitrarily taken for granted; but they are self-evident, they need no proof. Thus, too, in Philosophy the first principles are self-evident and need no proof.

61. As the mind must, of course, apprehend the premises before it draws conclusions from them, we say that in the **logical order,** *i. e.*, in the order of thought, the premises are always prior to the conclusions. But in the **ontological order,** *i. e.*, in the order of being, a truth stated in the premises may be really posterior to the truth expressed in the conclusion. Such is the case whenever we reason from an effect to its

* **Exercise.** Point out the fallacies contained in the following arguments:

1. "Liberty is desirable; but the laws restrict liberty; therefore the laws restrict what is desirable."

2. "The liberty of the press is a blessing; but blessings should not be restricted; therefore the liberty of the press should not be restricted."

3. "The Inquisition was the cause of much cruelty; but the Popes approved the Inquisition; therefore the Popes approved the cause of much cruelty."

4. "The Spanish Inquisitors were often cruel; but St. Peter Arbues was a Spanish Inquisitor; therefore the Saints are often cruel."

5. "Galileo was condemned by a Roman tribunal; therefore the Pope is not infallible."

6. "The Supreme Court of the United States is a fallible tribunal; therefore its decisions are not to be regarded."

cause, say from a beautiful picture to the skill of the painter; for the effect is posterior to the cause, is dependent on the cause.

62. Reasoning thus from effect to cause is reasoning **a posteriori,** and, *vice versa*, reasoning from cause to effect is called **a priori,** since causes are ontologically prior to their effects.

63. It will be noticed that the terms *a priori* and *a posteriori* have not exactly the same meaning when applied to reasoning and when applied to judgments. A **judgment a priori,** as explained above (No. 17), is one formed independently of experience, while a **reasoning a priori** is one proceeding from a cause to its effect.

64. While in *a priori* and *a posteriori* reasonings we consider relations between two things, one of which is ontologically prior to the other, in **analytical** and **synthetical** reasonings we consider only one thing, studying the relations between the whole being and its parts, between a substance and its qualities. If we are first acquainted with the whole being and from the study of it strive to discover its parts, we are said to analyze the subject (ἀναλύω, I take apart): we then proceed analytically. But if we know the parts first, and put them together to find the whole, we proceed synthetically (σύνθεσις, a putting together). The chemist analyzes a mineral to discover its simple ingredients; the apothecary combines simples into compounds. The synthetic geometrician puts together lines and angles to find the properties of surfaces and solids; while the analytical geometrician finds the particular mathematical relations implied in a general formula.

65. The metaphysician considers **an idea as a whole,** and the **notes of it as its parts.** For instance, knowing that an oak is a tree, he examines the notes involved in the concept

'tree,' and finds analytically that an oak is a substance, material, vegetable, etc. On the other hand, seeing that the human body is a substance, extended, living, sensitive, he concludes synthetically that it is of an animal nature. Now, it is obvious that the idea analyzed is less extended than the notes; *e. g.*, 'tree' is less extensive than 'substance,' for every tree is a substance, but not every substance is a tree. Therefore, when we reason analytically, we proceed *from the particular to the universal*, and *vice versa* we reason synthetically *from the universal to the particular.*

66. A science may use either **analysis or synthesis,** or now the one and then the other. Thus, in this treatise on Dialectics, while first explaining ideas, next the union of ideas into judgments, then the combination of judgments into arguments, we have used synthesis; and, in analyzing the nature of reasoning to discover the rules that must guide it, we have used analysis. This latter process is, in most studies, better suited for the investigation of truth, synthesis for the imparting of truth to others.

67. While treating of scientific methods, it is proper to speak of the **distinctions existing between various sciences.** These are distinguished according to their objects; thus, Astronomy is evidently distinct from Botany, because it treats of a different class of objects. When sciences treat of the same object, as do Geology, Geometry, and Geography, all of which study the earth, they view that object differently; and the view they take of their objects is called their *formal object*, the object itself being called the *material object.* Sciences are therefore more correctly said to be **specified by their formal objects.** It naturally follows that a science is esteemed as more or less noble in proportion as its formal object is more or less worthy of man. Theology is therefore the noblest of all, since it views all its objects as they are known

by the highest light, viz., by the supernatural light of Divine Revelation. Philosophy is the noblest of the merely human sciences, since its formal object is what is most intellectual in all things, viz., their very essences and their relations to the highest good.

68. The true teachings of any science can never come into **conflict** with the true teachings of any other science; for truth objectively considered is something absolute, not merely relative; it is *that which is*. In the case of an apparent conflict between two sciences, it will always be found that one of the conflicting teachings is not demonstrated nor capable of demonstration.

Article VIII. Exercise in Reasoning.

69. The most useful exercise in philosophic studies is the manner of discussion called **The Circle.** We shall here explain it at some length:

One pupil is appointed to defend on a given day, during about half an hour, any thesis that has been explained in the class; two others are appointed to object; and the whole discussion is to be conducted in strict syllogistic form. The discussion is opened by the first objector, who challenges the defender to prove the thesis. The latter begins by explaining the exact meaning of the thesis; he next gives the proof in a formal syllogism, adding, if necessary, the proof of the major or the minor, or both. The objector then attacks the thesis or its demonstration: he offers a syllogism the conclusion of which is contradictory to the thesis or to the validity of the proof. The defender repeats the objection in the very words of the opponent; next, he replies separately to each of its propositions.

Let us suppose that the third thesis of *Critical Logic*—**the theory of universal scepticism is self-contradictory** (No.

94)—is the subject of discussion. The defender, at the summons of the first objector, explains and proves the thesis. Then the first *objector:* "That is not self-contradictory which does not affirm and deny the same thing; but the theory of universal scepticism does not affirm and deny the same thing; therefore it is not self-contradictory." The *defender* repeats the objection word for word, and then adds: "The major, 'That is not self-contradictory which does not affirm and deny the same thing,' I grant. The minor, 'The theory of universal scepticism does not affirm and deny the same thing,' I deny." *Objector:* "I prove the minor: that does not affirm and deny the same thing which affirms nothing whatever; but the theory of universal scepticism affirms nothing whatever; therefore it does not affirm and deny the same thing." The *defender* repeats the syllogism, and adds: "The major, 'That does not affirm and deny the same thing which affirms nothing whatever,' I grant. The minor, 'The theory of universal scepticism affirms nothing whatever,' I deny." *Objector:* "I prove my new minor: the theory which doubts of everything affirms nothing whatever; but the theory of universal scepticism doubts of everything; therefore it affirms nothing whatever." *Defender*, after repeating the syllogism, adds: "The major, 'The theory which doubts of everything affirms nothing whatever,' let that pass. The minor, 'The theory of universal scepticism doubts of everything,' I deny." *Objector:* "I prove the last minor: universal scepticism is defined as the theory which doubts of everything; therefore universal scepticism doubts of everything." *Defender* repeats the enthymeme, and adds: "The antecedent, 'Universal scepticism is defined as the theory which doubts of everything,' I distinguish: as the theory which pretends to doubt of everything, I grant; as the theory which really doubts of everything, I deny; and therefore I deny the consequent."

Objector: "But the sceptic really doubts of everything; therefore the distinction is of no avail." *Defender* repeats, and adds: "The antecedent, 'The sceptic really doubts of everything,' I deny." *Objector:* "May I ask your reason for denying it?" *Defender:* "I deny it because no man can really doubt of everything; even his own existence; the fact that he is reasoning, speaking, etc." *Objector:* "But the sceptic sincerely affirms that he doubts of everything." *Defender:* "Then he affirms something, and thereby contradicts himself."

The Second Objector: "That should not be maintained as a thesis which cannot be validly proved; but it cannot be validly proved that universal scepticism is an absurd theory; therefore it should not be maintained as a thesis." The *defender* repeats, then adds: "The major, 'That should not be maintained as a thesis which cannot be validly proved,' I will let that pass for the present. The minor, 'It cannot be validly proved that universal scepticism is an absurd theory,' I deny, and therefore I deny the conclusion." *Objector:* "I prove the minor: that proof is not valid which takes for granted what cannot be proved; but the proof of this thesis does so; therefore it is not valid." *Defender* repeats, and adds: "'That proof is not valid which takes for granted what cannot be proved,' I distinguish that major: if that which is taken for granted needs proof, I grant; if it needs no proof, I deny. As to the minor: 'But the proof of this thesis takes for granted what cannot be proved,' I distinguish this the same way: it takes for granted what is evident, and therefore needs no proof, I grant; it takes for granted that which needs proof, I deny. And therefore I deny the conclusion, etc., etc."

BOOK II.

CRITICAL LOGIC.

70. We have studied, in *Dialectics*, the laws which govern the *form* of reasoning; in **Critical Logic** we are to examine the certainty of the propositions, *i. e.*, of the *matter* of reasoning, and the validity of the reasoning process itself. For this purpose we are to consider: 1. *The nature of certainty;* 2. *The existence of certainty;* 3. *The means of attaining certainty, and* 4. *The ultimate test or criterion of certainty.*

CHAPTER I.

THE NATURE OF CERTAINTY.

71. **Certainty** is defined as that state of mind in which we firmly adhere to a truth, on account of motives that exclude all fear of error. To study its nature, we must examine: (*a*) *The nature of truth and of its opposite, falsity;* (*b*) *The various states of our minds with regard to truth, and* (*c*) *The elements that make up certainty.*

Article I. Truth and Falsity.

72. **Truth** denotes *conformity between a mind and an object.* This conformity may be differently viewed:

1. When we consider the knowledge of the mind as conformable to the object known, we have **logical truth**; thus we speak of 'true judgments,' 'a true understanding of a fact or of a theory,' etc.
2. When we consider an object as cognoscible, *i. e.*, as conformable to real or possible knowledge, we have **metaphysical truth.** In this sense the truth of an object is really identical with the very being of the object, for an object is cognoscible inasmuch as it has being; therefore all things have metaphysical truth.
3. When we consider language as conformable to the knowledge of him who uses it, we have **moral truth**; thus we say: 'a true account,' 'a true statement,' etc.

Logic treats of logical truth.

73. **Falsity** is the opposite of *truth.* The mere absence of truth is sometimes called *negative falsity;* but this is not falsity in the proper sense of the word. We never speak of metaphysical falsity, for all things have metaphysical truth: even a false coin is truly what it is, and cognoscible as such; when we call it 'false,' we use a figure of speech by which we mean 'calculated to deceive.' **Logical** falsity exists when there is something in the intellect which is not conformable to the object; **moral** falsity, or falsehood, exists when there is something in the expression not conformable to what is in the mind.

74. **Logical falsity may occur in a judgment in three ways:**

1. The intellect may affirm something which is not in the object; as when it affirms that matter can think, or it counts six stars where there are but five.

2. It may affirm as real what is only apparent; *e. g.*, that the sun moves around the earth.
3. It may deny what really is, *e. g.*, the motion of the earth.

75. The terms 'true' and 'false' are chiefly applied to **judgments** and propositions. Still, a mere **apprehension** or idea may also be called true; for it contains conformity between the mind and an object. But a mere apprehension is never called 'a truth'; this expression is confined to a judgment or a proposition.

76. **Thesis I.** *A mere apprehension, as such, cannot be false.* *Proof.* A mere apprehension, as such, is merely a mental image of something real or possible (for we cannot have an image of something absolutely impossible, *e. g.*, of a square circle, nor of a mere nothing); but every image, as such, *i. e.*, in as far as it is an image, is necessarily conformable to that of which it is the image; else it would not be the image of it. Therefore, inasmuch as it is an image at all, it is true, not false. A portrait may not resemble the person who sat for it, but it represents what it represents, and so far it is a true image.

77. If it be **objected** that we may have a wrong idea or notion of a thing, *e. g.*, of a spirit, conceiving it as a being composed of thin air, we *answer* that our concept of a being composed of thin air is a true idea; for such a being is possible; but, if we go on to judge that such a being is what is called a spirit, we do more than conceive an idea—we join two ideas, we pronounce a judgment. It is not then the mere apprehension but the judgment which is false.

But can we not have an idea to which no possible being corresponds, *e. g.*, of a 'square circle'? We have ideas of 'square' and of 'circle'; but we cannot either imagine or conceive a square circle. If we proceed to form a judgment that these ideas are compatible with each other, the error is

in our judgment, not in our apprehensions. We do not deny that many men have wrong ideas, *e. g.*, of religion, of the Catholic Church, of indulgences, of literary excellence, of honor, etc.; but the falsity in those ideas is due to the false judgments which those ideas implicitly contain, not to the ideas as ideas. For instance, a man conceives of an indulgence as 'leave to commit sin,' and he judges that this is the meaning of the word in Catholic doctrine.

Article II. States of the Mind with Regard to Truth.

78. 1. **Ignorance** is the state of a mind to which the truth is not presented at all; thus, we are all ignorant whether the number of the stars is odd or even. Ignorance is *vincible* if it is in our power to remove it; else it is *invincible*.

2. **Doubt** is the state of a mind hesitating whether to assent to a truth or not. A *positive* doubt sees reasons for and against assent; a *negative* doubt sees no reasons for either side; it comes to the same as ignorance. A mere doubt inclines the mind to neither side; but doubt may be accompanied by suspicion or opinion.

3. **Suspicion** is the state of a mind which has more leaning to one judgment than to its contradictory, but still pronounces no judgment.

4. **Opinion** is the state of a mind pronouncing a judgment, but not without fear of error. The motives for assenting are called the *probability* of a judgment. **Probability** is said to be *intrinsic* when the motives for assent are drawn from the consideration of the matter; *extrinsic*, when they are drawn from the statements of other persons.

5. **Certainty** is the state of a mind assenting to a truth without fear of error. If this fear of error is excluded by motives which leave no room for reasonable doubt, we have certainty in the *proper* sense of the word; if the fear of error is excluded without such motives, we have certainty *improperly* so called. In the latter case, the fear of error is excluded by the free action of the will, which turns away the intellect from considering all reasons of doubt.

79. It is useful to distinguish **speculative** from **practical** judgments: the former regard the certainty of knowledge, *e.g.*, "The bread before me is not poisoned"; the latter, the prudence of action, *e. g.*, "I may eat that bread without further examination." We act prudently when we look for the best guidance of reason that circumstances allow; strict certainty cannot be had concerning every step of daily conduct.

80. Since prudence is not inconsistent with a possibility of error, there may be **invincible error** connected with prudent practical judgments; but all error is inconsistent with strict certainty, and there can be no invincible error connected with judgments which are strictly certain.

81. Error in judgments of any kind, speculative or practical, is always **traceable to free will.** It cannot, of course, be caused by the objective truth; nor can the intellect be necessitated to judge falsely, since its very essence consists in the power of knowing, *i. e.*, grasping, truth. There remains only one possible cause of error, viz., man's freedom to embrace a proposition. The free will of man can often bend the intellect so to fix its attention on the probabilities of a proposition as to overlook all reasons to doubt, and thus form a false judgment, firmly adhering to it without fear of error: this is not certainty, however, in the proper sense of the word (No. 78. 5).

82. **Error** or falsity cannot strictly be predicated of *ignorance*, *doubt*, or *suspicion*; for these states of the mind neither affirm nor deny anything whatever. Ignorance may be culpable, doubt may be unreasonable, suspicion unfounded and rash; but none of these is properly called false. Error can be predicated of nothing but *opinion* and *certainty* improperly so styled, *i. e.*, of that state of mind which excludes the fear of error by the force of the will.

83. While the will is the ultimate source of all error, there are various **proximate sources**; the chief are:

1. *Prejudices*, *i. e.*, judgments formerly assented to without proper examination.
2. Imperfect *teaching* or false information regarding facts and principles.
3. *Confusion of ideas*, whether resulting from dulness, *i. e.*, slowness to distinguish between things similar, or from present inattention, owing to fatigue, negligence, multiplicity of cares, etc.
4. *Passion*, *i. e.*, violent desire or aversion, which prompts our will to accept as true what is pleasing to us.
5. *Impatience* to arrive at a conclusion, either because we are eager to act, or too conceited to doubt our judgment, or too vain to acknowledge our ignorance. From all this it is evident that virtue is favorable to the acquisition of sound knowledge.
6. Another frequent source of erroneous judgments in many persons is a diseased condition of the nervous system or a portion of it. This abnormal state of the body may give rise to a variety of phantasms so vividly presented to the mind as to prevent calm consideration of the reasons for or against the formation of a judgment.

ARTICLE III. THE ELEMENTS THAT MAKE UP CERTAINTY.

84. We have defined *certainty proper* as the state of mind in which we firmly adhere to truth, on account of motives which exclude all fear of error. Several elements are here combined: 1. **Subjectively**, *i. e.*, considering the acts of the mind, we have a firm adhesion (a positive element), and the exclusion of all fear of error (a negative element). 2. **Objectively**, *i. e.*, considering the object known, we have such a manifestation of a truth as is sufficient to exclude all fear of error. The subjective adhesion is caused by the objective manifestation of truth. It is called *subjective certainty*, the manifestation of the truth being designated as *objective certainty*.

85. When the mind reflects on the fact that it has this firm adhesion, its certainty is called **reflex**; when it does not reflect on this fact, its certainty is **direct**. **Philosophical certainty** does not differ from ordinary reflex certainty except in this, that it notices distinctly and scientifically the motives of adhesion to a truth.

86. If we examine objective certainty still further, we find that the truth manifested may be of *three species*, which give respectively three different names to certainty; viz.:

1. Certainty is called **metaphysical** when the mind sees that a proposition is essentially true because its contradictory would be absurd; in such a case an exception is absolutely impossible; *e. g.*, "Virtue is praiseworthy," "A triangle has three sides."
2. Certainty is **physical** when a fact is seen to be so necessary, according to the laws of material nature, that no one but the Author of those laws can make an exception; *e. g.*, "The dead do not return to life."
3. Certainty is **moral** when the mind sees that something

is constantly and universally true in the conduct of men, although dependent on their free choice; *e. g.*, "Serious men do not tell a falsehood on important points without weighty motives."

87. The term 'moral certainty' is often used in a **looser sense** to denote a strong probability; *e. g.*, I have a moral certainty that this house is not on fire just now, though I have no real certainty on the subject.

88. Subjectively considered, all kinds of certainty are alike in the **negative element**, *i. e.*, all exclude fear of error; but the **positive element**, *i. e.*, the intensity of the mind's adhesion to the truth, may be more or less firm: in some cases, as in axioms, and generally in all that is immediately evident, the mind cannot doubt the agreement of subject and predicate. Thus, we cannot help seeing that a whole is greater than its parts, that some bodies exist, that virtue and vice differ from each other, etc. Even in many things that are only mediately evident we cannot entertain a doubt; *e. g.*, no well-informed man can doubt that ancient Rome existed. In many matters, however, we can refuse to admit the objective truth; and in others we even find it difficult to steady our attention sufficiently on the object to exclude all doubt. Metaphysical certainty admitting no possible exception is, as such, nobler than the other kinds; still, it is not always stronger in a given case; thus, I am more intensely convinced of Cæsar's death, which is a matter of moral certainty, than of many theses in Mathematics or Philosophy, which rest on metaphysical principles.

CHAPTER II.

THE EXISTENCE OF CERTAINTY.

89. Scholastic Philosophy begins, as the Physical Sciences pretend to do, by ascertaining and examining **undeniable facts;** in this particular it differs strikingly from many false systems in Philosophy which commence with theories directly contradictory to all experience. When entering on the subject of the existence of certainty, we are at once brought face to face with a patent fact which may be stated thus: *All men having the full use of reason exhibit a direct and natural adhesion to many truths as objectively certain.*

90. We are not yet maintaining that those truths *are* objectively certain; we are only stating the undeniable fact that all men adhere to them as objectively certain. We call this adhesion *direct, i. e.*, antecedent to reflection and to philosophic analysis. For instance, all men consider their own existence, the existence of bodies, the connection between cause and effect, the difference between right and wrong as objectively certain. (See Balmes's *Fundamental Philosophy*, cc. 1, 2, 3; Kleutgen's *Philosophie*, 3d Treatise.) No fact on which any physical science relies is more undeniable. We have called this adhesion *natural*, because in science we call any effect natural if it is found constantly and universally to attend a given cause. Now, this adhesion is constantly and universally found in man; therefore it must be natural to man.

91. **Thesis II.** *This direct and natural adhesion of all men*

to many truths as objectively certain is (*a*) *certainty properly so called;* (*b*) *not indeed philosophical certainty, but* (*c*) *capable of becoming such.*

Proof: (*a*) Certainty properly so called is a firm adhesion to a truth, on account of motives which exclude all fear of error. But the adhesion here spoken of is such; therefore it is certainty properly so called. *We prove the minor:*

1. *It is firm;* in fact, man cannot rid himself of it.*
2. *It excludes fear of error; i. e.,* we do not mistrust these judgments.
3. This fear of error is excluded by the evidence of the *objective truth.* As St. Thomas expresses it: "It is the property of first principles that they not only are necessarily true, but also manifest themselves evidently as objectively true." If this fear of error were not excluded by the evidence of the objective truth, it would be excluded either by the free will of man or by a blind necessity compelling man to judge wrongly. But it is not excluded by our will, for we adhere to the truth even against our will. Nor by a blind necessity to judge falsely; for then our intellect would be no intellect at all, since an intellect is a power to see the truth, not a power to act blindly.

(*b*) *This direct adhesion is not itself philosophic certainty;* for it is antecedent to reflection and analysis, while philosophic certainty is subsequent to both.

(*c*) *It is capable of becoming philosophic certainty;* for, when reflected on and analyzed, it is distinctly seen to contain motives sufficient to exclude all fear of error, and thus the

* The sceptic Pyrrho, when laughed at for fleeing from a falling stone with as much earnestness as if he had no doubt of its reality, replied ingenuously: "It is hard entirely to throw off human nature." If any votary of philosophy should begin to have any real doubts of the existence of certainty, he would need rest of mind and healthy exercise of body, not abstract reasoning, to convince him of objective certainty.

element is supplied which constitutes the accidental difference between ordinary certainty and philosophic certainty, viz., the distinct perception of the motives for adhesion to truth (No. 85).

92. **Objections:** 1. This reasoning supposes several things that have not yet been demonstrated; *e. g.*, that we have understanding. *Answer.* It does not suppose anything that needs demonstration or that could reasonably be doubted.

2. Some judgments in which all men concurred were false; *e. g.*, that the sun moved round the earth. *Answer.* All men *judged* that the sun moved around the earth, we distinguish; they judged about the scientific question whether it was the earth's or the sun's motion that caused the phenomena perceived, we deny; few men gave this question any thought, and those who did would naturally judge that the motion *appeared* to be in the sun. If any judged that it *was* in the sun, they erred freely. All judged that the sun was seen in different directions successively, we grant. They called that change 'motion,' and so do even the learned to-day, when they speak of the sun as rising and setting, and they distinguish apparent from real motion, relative from absolute motion.

93. The only escape from the thesis just proved is that attempted by the **Sceptics**, *i. e.*, by those few philosophers who pretend that man can really be certain of nothing. Sceptics are of two kinds: *universal* or *subjective* Sceptics, who refuse to admit any certainty at all, even that of their own existence; and *partial* or *objective* Sceptics, who admit their own existence and nothing or very little more.

94. **Thesis III.** *The theory of Universal Scepticism is self-contradictory. Proof.* That theory is self-contradictory,

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which affirms and denies the same thing; but such is the theory of universal Scepticism. Therefore it is self-contradictory. *We prove the minor:* Scepticism denies that there is any certainty at all; at the same time it implicitly affirms several things as certain; *e. g.*, that certainty is something different from doubt, that the words used have certain meanings, that those using them exist, etc. If the Sceptic should plead that he does not hold even those points as certain, he must then grant that, for all he knows, he may be saying and even meaning just the contrary of what he teaches, which would be an absurd theory; but even this would implicitly affirm that the Sceptic exists, speaks, etc.

95. In connection with Scepticism, we must consider the **Methodic Doubt** recommended by Descartes, who, under the Latinized name of Cartesius, wrote in the middle of the seventeenth century. He was not a Sceptic; but he traced out a false system of studying the existence of certainty: destroying the solid basis of Philosophy, he substituted for it a weak fabric of his own invention, and left little in the minds of his followers but ruin and confusion. He maintained, (*a*) That every philosopher should begin his speculations by doubting of everything. (*b*) Next, the philosopher will find that he cannot help granting the fact of his own thought, and he will conclude from it his own existence: *Cogito, ergo sum*—"I think, therefore I am." (*c*) Hence the would-be philosopher will infer the general rule that whatever is clearly perceived is true. (*d*) Then finding that he clearly perceives the idea of God, he thence concludes to the existence of God. (*e*) From the veracity of God he infers the reliability of his own faculties. (*f*) Thence, at last, he reasons to the certainty of his knowledge.

96. **Thesis IV.** *Descartes' Methodic Doubt is absurd. Proof.* That is absurd which affirms and denies the same thing; but

the doubt in question does so. For in it the philosopher begins by denying the reliability of reason, and at once implicitly affirms its reliability by using it to prove his own existence: "I think, therefore I am." He pretends to doubt all his faculties, and still he treats the guidance of those same faculties as reliable. Besides, Descartes moves in a vicious circle: he proves the reliability of our faculties by the veracity of God, and the veracity of God by the reliability of our faculties, etc.

97. The error of Sceptics arises from their **false supposition** that nothing is certain which is not demonstrated by discursive reasoning. Now, the science of Mathematics begins by the admission of axioms which are self-evident; *e. g.*, that "the whole is greater than a part," that "two things equal to a third are equal to each other," etc. The science of Philosophy must follow a similar process: it must draw its first conclusions from premises which are evident without proof. Besides, like Mathematics and all other sciences, it must admit without proof the reliability of the reasoning process. If the first premises and the reliability of reason required proof, man could never make the first start in scientific studies; in fact, he would be incapable of reasoning at all: he would not be a rational being.

98. Every philosopher, therefore, must, on entering the field of science, affirm with certainty: 1. His own existence; called *the first fact.* 2. The principle of contradiction, viz., that a thing cannot 'be and not be' at the same time; called *the first principle.* 3. The power of the intellect to know truth; called *the first condition.* These truths are not blindly admitted: they are seen to be objectively evident. There is no alternative between admitting them and admitting the self-contradiction of universal Scepticism.

99. To refute **partial Scepticism**, we must prove the reli-

ability of the various means by which certainty may be attained, as we shall do in the following chapter. Still, the arguments which we shall adduce will, in many cases, be rather *scientific explanations than strict proofs : scientific explanations*, because they will show distinctly what causes or reasons we have for firm adhesion to the truths; *not strict proofs*, because the reliability of the means in question is in several cases proved while taking their reliability for granted, as having no need of demonstration.

CHAPTER III.

MEANS OF ATTAINING CERTAINTY.

100. The **means at our disposal to attain certainty** are, *directly*, our own cognoscive powers or faculties, viz., intellect and sensation, and, *indirectly*, the authority of other men. To explain these clearly we must treat: 1. Of *our cognoscive powers in general;* 2. Of *Intellect* in particular; 3. Of *sensation;* 4. Of *authority*. To all this we shall add a chapter on *common sense*, which, though proceeding from the intellect, requires for the discussion of its certainty the previous understanding of the reliability of intellect, sensation, and authority.

ARTICLE I. A SKETCH OF OUR COGNOSCIVE POWERS.

101. I. **The outer senses.** Our first step in the acquisition of knowledge is the perception of material objects by means of material instruments which are parts of ourselves, and are called the organs of sense.

102. An **organ** is a part of a living body peculiarly constructed by the Creator for the purpose of exercising a function of life. Living bodies are made up of such organs. In man, and in the higher animals generally, five of these organs are intended for the perception of exterior bodily objects; these are called the organs of the five outer or exterior senses, viz., of the *sight*, *hearing*, *smell*, *taste*, and *touch*.*

* Physiologists now split up the touch into two senses, the tactual or skin sense and the muscular sense; the former perceives heat and cold, roughness and smoothness, etc.; the latter perceives resistance, exteriority, and extension. President McCosh

103. II. **The inner sense.** There is, besides, an internal or inner sense, whose organ is some portion at least of the nervous system; it perceives interior modifications of the animal body, such as cause the feelings of hunger, thirst, fatigue, pain, comfort, etc. It also perceives the actions and affections of the various external senses; for an animal not only sees, hears, tastes, etc., but it also *feels* that it sees, hears, tastes, etc. This inner sense, in as far as it takes cognizance of what is done by the outer senses, is often called *the common sense*, and its organ is styled the common sensory; but the term *common sense*, without the definite article 'the,' stands for a very different idea, viz., for the common judgment of men on matters of universal importance to mankind.

104. The inner sense does not perceive the causes of the affections which it perceives, but only the fact that those affections exist. As both the objects of sensation and its organs are material, **the action of all sensation is material,** organic, and is common to man and brute. But the organ is, of course, not dead but living matter; it is one substance with the soul, *i. e.*, with the principle of life; hence the actions of any sense are actions of the living compound soul and body.

105. III. **The imagination.** When an animal perceives

describes it thus, quoting Wundt's *Beiträge zur Theorie der Sinneswahrnehmung:* "When we move our members we come upon external resistances. We observe that these resistances sometimes give way before our pressure; but we find at the same time that this takes place with very different degrees of facility, and that, in order to put different bodies in motion, we must apply very different degrees of muscular force; but to every single degree of the contraction-force there corresponds a determined degree in intensity of the muscular sensations. With these muscular sensations, the sensations of the skin which cover our members of touch so continually mingle, that the intensity of these touch-sensations goes parallel to the intensity of the accompanying muscular sensations. We succeed in this way in connecting the degree of intensity of the muscular sensations in a necessary manner with the nature of the resistances which set themselves against our movement" (*Defence of Fundamental Truth*, p. 173).

material objects, it forms and retains of them material images or representations, called *phantasms*. The organ used for these purposes is the brain. The imagination is the power of forming and retaining those images, of recalling them on occasions, and of combining them in wonderful varieties, thus forming new phantasms which in turn may be recorded and retained, etc. We should not suppose those images to be pictures, for we can have no picture of taste, smell, etc.; they are modifications of some kind.

106. IV. **The sensile memory.** This name denotes that portion of the imaginative power which retains and recalls the phantasms, but it adds a further function, viz., that of recognizing, not intellectually however, present sense-perceptions and present phantasms as identical with former phantasms and former sense-perceptions. By this faculty "The ox knoweth his owner, and the ass his master's crib," as Holy Writ expresses it. The inner sense, the common sense, the imagination, and the sensile memory need not be considered as distinct faculties, but rather as various functions of the same faculty, which may be generally designated as *the inner sense.*

107. V. The **intellect,** understanding, or mind, in the proper meaning of this term, is an entirely different faculty; it does not confine its perceptions to the material qualities of objects, as all sense-action does, but it penetrates into the very essences of things material and immaterial (*intus legit*, it reads within), and it forms concepts or ideas representing essences, *e. g.*, of 'plant,' 'tree,' 'spirit,' etc. Even when it considers mere accidents, *e. g.*, 'color,' 'shape,' 'size,' it need not simply consider this individual color, shape, or size, as material faculties must do, but it can consider the essence of color, shape, and size; so that, by a power peculiar to itself, it forms ideas representing qualities as abstract—*i. e.*, drawn

forth, as it were, from the subjects in which they are found and thus stripped of their individuality.

108. VI. **The judgment.** Besides conceiving ideas, the intellect judges; *i. e.*, it compares two ideas together and pronounces on their agreement or disagreement. This act of the intellect is called *judgment;* it was explained in *Dialectics* (No. 17).

109. VII. **Reason** is not a faculty distinct from the intellect and the judgment; it is the intellectual act or process of deriving judgments from other judgments; it, too, was sufficiently explained above (No. 22).

110. VIII. **The intellectual memory** is another function of the intellect; it enables us to perceive and reproduce ideas, judgments, and reasonings formerly elicited, and to recognize identity or difference between present and former objects of knowledge. The intellectual memory is greatly assisted in its action by the sensile memory, which associates phantasms with mental concepts.

111. IX. **Consciousness** is the intellectual power of perceiving our own internal acts, whether of intellect and will or of our interior sense; it will be more fully explained in the following article.

Article II. The Intellect in Particular.

112. **The intellect** or understanding may be called the *universal means* by which certainty is to be acquired; for certainty is a state of the mind or intellect, and therefore it cannot be reached except by the intellect. That the intellect may begin to act, it must be excited by sensation; and therefore those whose senses are very imperfect remain idiotic. But sense, no matter how perfect, can never elicit a judgment. Still, sense is a means by which the human intellect is brought into communication with many objects of knowledge, and

the reliability of sense-perception will be examined in the next article.

113. We are just now concerned with **the certainty of intellectual knowledge as such.** We must begin this study by recalling to mind that *the first condition* for the attaining of all certainty is the capacity of the intellect to reach truth. We need not, then, prove the reliability of our intellect. But we must here examine *what is involved or included in this capacity of the intellect to know truth.*

It involves the certainty, 1. Of *consciousness;* 2. Of our *primary ideas;* 3. Of *immediate analytical judgments;* 4. Of the *intellectual memory;* 5. Of the *reasoning process.* We shall examine the reliability of these functions of the intellect in detail; in doing so, we shall *scientifically explain* rather than *prove* our theses; for the first condition of certainty needs no proof.

§ 1. *Consciousness.*

114. **Consciousness** is the reflex perception of our own acts, *i. e.*, of ourselves as acting. We not only think and feel, but, when we reflect, our mind perceives that we think and feel. This reflection consists, as the word indicates (*reflectere*, to bend back), in the bending back of the mind upon itself, upon its own acts. Reflection is, of course, not the beginning of our knowledge; for we must first think and feel before we can perceive that we think and feel. But when we scrutinize our own knowledge, this reflection on self is the first act to be examined in the process of our study.

115. This reflection should not be confounded with reflection in the sense of *remembrance.* **Nor should consciousness be mistaken for the inner sense,** explained above (No. 103). It differs from it: (*a*) In the *subject* that elicits the act: consciousness is elicited by the simple intellect, sensation by the human compound; (*b*) In the *object* perceived: con-

sciousness perceives both simple and organic actions, the inner sense organic actions only; (*c*) In the *manner* of perception: the perception of sense terminates in phantasms, that of consciousness in ideas and judgments, affirming that the facts exist, *i. e.*, that we really think or feel as we are conscious we do. But consciousness is not the function which perceives what are the causes of our feelings, *e. g.*, the causes of pain or comfort experienced; such causes are made known to us by reasoning and repeated observation united, *i. e.*, by induction.

116. **Thesis V.** *The reliability of consciousness is included in our capacity to know truth.*

Explanation. We are not proving our capacity to know truth; this capacity needs no proof (Nos. 97, 98); but we maintain here that this same capacity of our intellect to know truth could not exist unless our consciousness were reliable.

Proof. That is included in our capacity to know truth, without which we could never know whether we know or not; but without the reliability of consciousness we could never know whether we know or not. Therefore—

We prove the minor. It is only through consciousness that we know our own intellectual acts; therefore, if consciousness were not reliable, we could not really know whether we are eliciting acts of knowledge.

117. It will be noticed that the field of **consciousness covers** the following objects of knowledge: 1. Our own existence; for we perceive ourselves as being the subjects of our intellectual acts and of our sensations. 2. The existence of our intellectual acts. 3. The existence of our internal sense and of its acts.

118. **It may be objected:** 1. We are not conscious of all our internal acts. *We answer:* We claim certainty for those only of which we are conscious.

2. Many persons are conscious of affections which do not exist; *e. g.*, that they are ill when they are not ill. We *answer:* They are conscious of certain feelings, from which they infer by faulty reasoning that they are ill. Consciousness reveals only the existence of the feelings, not their causes.
3. Lunatics are conscious of being kings, princes, etc. *Answer.* They are conscious of judging themselves to be kings, etc., and they do judge so owing to their diseased imagination. For lunacy supposes an inability to distinguish between imaginations and real perceptions; but the consciousness of even a lunatic is reliable.
4. No one can know that his certainty is not owing to a diseased imagination. *Answer.* If so, universal Scepticism would follow, and the intellect would be incapable of knowing truth.
5. The proof takes for granted the reliability of our consciousness, the point to be proved. *Answer.* We are not giving a strict proof, but only a scientific explanation; for the first truths cannot be strictly proved and need no demonstration.

§ 2. *Primary Ideas.*

119. By **primary ideas** we do not mean inborn ideas; for no ideas are inborn in us: we have no ideas antecedently to sense-perception. But whereas by sense we form phantasms or material images of bodies observed, we form by our intellect ideas or immaterial images of what is cognoscible in those bodies; *e. g.*, of 'being,' 'substance,' 'size,' 'color,' etc. The objects of sense are necessarily individual, extrinsic, and concrete qualities; the proper objects of the intellectual idea are universal and abstract notes.

120. **We call primary ideas** those of 'being,' 'truth,' 'substance,' 'cause,' 'effect,' etc.; all those, namely, that are involved in our commonest perceptions. Of these we assert that they have *objective truth*, and that their objective truth is implied in the very capacity of our intellect to understand truth. Kant makes them *subjective forms* only, to which nothing objective corresponds.

121. **Thesis VI.** *Our primary ideas are objectively true, i.e., conformable to objects really existing.*

Proof. If these ideas were not objectively true, not conformable to objects really existing, our commonest knowledge would be but an illusion; if, for instance, 'being,' 'truth,' 'substance,' etc., were mere figments of the imagination or of the intellect, we could never know anything. Therefore they are objectively true.

122. It must be carefully noticed, however, that the *object of a universal idea* does not really exist as a universal object: everything that really exists is an individual thing. Likewise, the object of an abstract idea does not really exist as an abstract object: every existing being is concrete. For instance, there exists no real abstract or universal cause, nor any real abstract and universal effect, substance, being, etc., just as there exists no real abstract or universal animal, which would be neither rational nor irrational, but simply have the qualities that make up the genus animal. How, then, is the idea 'animal' objectively true? Because the qualities expressed by the term 'animal' really exist in every individual animal. Nothing, then, in nature *exists* in the abstract; but anything may be viewed in the abstract by the intellect, and abstract notes are the distinctive objects of intellectual cognition.

123. Now, the abstract idea is the same as the universal idea: the word '**abstract**' denotes the manner in which such an idea is formed, while the word **universal** denotes its

applicability to many objects. Thus, I form the abstract idea 'animal' by attending to the notes, which I perceive in any individual animal, viz., 'a material substance endowed with life and feeling'; these notes I draw forth, or abstract (*abstraho*), for separate consideration, or, if you wish, I withdraw my attention from the other qualities of that same individual animal which I am considering. Since these same notes conceived are common to all animals, my concept of 'animal' is a universal concept, *i. e.*, it is predicable of a whole class. In as far as my idea 'animal' denotes only the qualities or notes that make up its *comprehension*, it is called a **direct universal**; but when I reflect besides that the idea is applicable to many beings, *i. e.*, when I consider also its *extension*, the idea is then called a **reflex universal.**

124. Philosophers have warmly disputed upon the nature of these reflex universals: the **Nominalists** call them *mere names*, which are given to a confused collection of individuals, but to which no concepts correspond; the **Conceptualists** call them *concepts*, but they suppose those concepts to be mere figments of the intellect to which no real objects correspond; the **Exaggerated Realists** supposed that *universal beings* really exist corresponding to the universal concepts; the **Moderate Realists** maintain that *some reality* in objects corresponds to the abstract idea, yet that such reality does not exist objectively as an abstract or universal being without individualizing notes, but it exists concretely in each individual object. The explanation we have given in the two preceding numbers is that of the moderate realists; but the scientific proofs of our doctrine and the refutation of other systems belong to Psychology.

§ 3. *Immediate Analytical Judgments.*

125. **Analytical judgments,** as explained above (No. 17), are those judgments in which the agreement or disagreement

of the subject and predicate is perceived by the mere analysis of their meaning, without the aid of experience. If this agreement or disagreement is perceived at once, without reasoning, the judgments are said to be **immediate.**

126. **Thesis VII.** *Immediate analytical judgments can never be false.*

Proof 1. That such judgments cannot be false is made evident by considering their very nature; for they consist in affirming or denying explicitly what the very idea of the subject contained or excluded implicitly; *e. g.*, when I conceive 'a part,' I conceive something as distinct from 'the whole,' and distinct from it by being less. Thus all immediate analytical judgments, *e. g.*, 'The part is less than the whole,' do no more than affirm or deny explicitly what the subject of them contained or excluded implicitly before the judgment was formed.

Proof 2. Our intellect has the power to know truth (No. 98). Therefore that can give us real certainty which is implied in the capacity of our intellect to know truth, or which must be objectively true if the intellect can know truth at all. But such are these judgments. For if our intellect could not be relied on in these judgments, *e. g.*, that 'a circle is round,' that 'a part is less than the whole,' etc., then the intellect could never be relied on in any judgments; for none are more evident. Therefore it can be relied on in these: they give us real certainty.

127. **Objections:** 1. This thesis cannot be demonstrated. *Answer.* It need not be; for it is evident.

2. Some of the judgments are false, *e. g.*, "The whole is greater than the part"; for the whole Blessed Trinity is not greater than any of the Persons. *Answer.* The Divine Persons are not parts of God; each of them is the infinite God whole and entire.

3. Another of these judgments is false, viz., "Out of nothing nothing can be made"; for the world was made out of nothing. *Answer.* This analytical judgment means that nothingness cannot be a material out of which a thing can be made, while, in creating, God made the world without using any material; He did not make nothingness the material of His creation.
4. All our judgments are empirical; for they presuppose sensation. *Answer.* They presuppose sensation before we can conceive the ideas, we grant; they compare the ideas by attending to experience and sensation, we deny. Now, the latter is required for empiric judgments. (No. 17.)
5. No judgments are certain; for to err is natural to man. *Answer.* To err sometimes in his opinions, yes; to err in his certain judgments, no.
6. Analytical judgments are useless; for their predicates are contained in their subjects, even though no judgments be elicited. *Answer.* They formally and explicitly discover and express what predicates are implicitly contained in their subjects.

§ 4. *Memory.*

128. **Memory** is the power of retaining and re-awaking former knowledge, and of recognizing it as former knowledge. It is twofold:

1. **The sensile memory** retains and re-awakes phantasms—*e. g.*, of a whip formerly seen or heard and of a pain felt—and it perceives a connection or association between those phantasms. In this way brutes remember as well as men. (No. 106.)
2. **The intellectual memory** retains and re-awakes ideas —*e. g.*, of what we formerly saw, felt, read, thought, or

willed—and it judges that the objects of those ideas were formerly perceived. In man the sensile and the intellectual memory work together and assist each other.

129. The memory acts **voluntarily** when it recalls the past at will; **spontaneously,** when the will has no share in the act. To act spontaneously, the memory must be aroused by a perception in some way associated with a former perception; *e. g.*, the fragrance of a fruit may recall its taste; the idea of eternity may recall the shortness of this present life.

130. **Thesis VIII.** *The reliability of our memory is contained in our power to know truth.*

Explanation. We do not maintain that we can recall all our former perceptions; but simply that, when our memory does recall a former perception, and judges with certainty that the object now recalled is identical with an object perceived before, it is reliable in such a judgment, and that this reliability of the memory is contained in the power of our intellect to know truth.

Proof. That is included in the intellect's power to know truth, without which all connected thought and all expression of thought would be impossible. But the reliability of our memory is such. For, unless our memory were reliable, we could not think connectedly, since one judgment would be forgotten before another could be compared with it; and no thought could be expressed, because no words could be remembered to express them.

131. If it be **objected** that our memory often deceives us, we *answer:* Not when it gives us, on careful consideration, positive testimony, excluding all fear of error. But men are often too careless, impatient, or presumptuous to examine their recollections properly.

§ 5. *Reasoning.*

132. When we attempt to reason in order to prove the

reliability of reasoning, we evidently do not pretend to give a strict proof; we simply give a **scientific explanation**, showing why it is that a conclusion logically derived from true premises must be as certain as the premises themselves.

133. **Thesis IX.** *Whoever grants the premises of logical reasoning cannot deny the conclusion.*

Proof. All logical reasoning, as explained above (Nos. 22, etc.), is based on this principle, that the conclusion is implicitly contained in the premises. Hence, he who would grant the premises and deny the conclusion would thereby affirm and deny the same thing; but one cannot deny what he affirms. Therefore whoever grants the premises of logical reasoning cannot deny the conclusion.

134. **Objections**: 1. If the conclusion were contained in the premises, nothing new would be learned by reasoning. *Answer.* The knowledge of the conclusion is new to us; for, although the conclusion was implicitly contained in the premises, we did not know this conclusion in particular till we arrived at it by reasoning. Thus, all the theorems of Geometry are derived from the preceding theorems and ultimately from the axioms.

2. Reasoning leads men into many errors. *Answer.* Not when it is materially and formally correct.

3. The proof given holds only for the syllogism. *Answer.* All reasoning is reducible to the syllogistic. (See Nos. 35, etc.; in particular, for induction, No. 46.)

Article III. Sensation.

135. The faculty of **sensation** distinguishes all animals from all vegetable substances; for 'sentient' is the *difference* which, added to the *genus* 'living material substance,' con-

stitutes the *species* 'animal.' By saying man is an 'animal' we mean exactly this, that he is a living material substance endowed with sense.

136. Now, sense is a cognitive power, *i. e.*, a power of knowing; its action, or knowledge, is elicited by a living material substance, and its organs consist of the living material nerves. It is a clear and certain principle that no action can be superior to the agent, else the effect would exceed the cause; therefore, as sense is a material power, **it can know nothing higher than material objects.**

137. Besides, any matter is a concrete individual portion of matter; both the organs and the objects of sense are such, and therefore every sense-action will be a concrete individual modification of a concrete individual portion of matter. But it is evident that a concrete individual modification of a concrete individual portion of matter can picture or represent by its own nature nothing but a concrete and individual modification of matter; now, perception of sense consists in such representation, hence **sense can perceive nothing but concrete and individual modifications of matter.**

138. When sense perceives the material modifications that take place within its own animal body, it is called **inner sense**; when it perceives the material modifications that take place outside of its animal body, it is called **outer sense.** Inner sense was more fully explained above (Nos. 103, 104).

§ 1. *The Inner Sense.*

139. The **inner sense** does not testify to the causes of our feelings or affections; for by our inner sense we merely feel a certain affection called pain or comfort; by our animal instinct we are prompted to seek relief of the pain or increase of the comfort; but it is only by a process of inductive reasoning that we have learned intellectually to refer this

certain feeling to a special cause. Thus we have learned by long experience that a peculiar feeling of discomfort arises from want of food, another from want of drink, etc.

140. **Thesis X.** *Inner sense is reliable in its perceptions;* i. e., *the material modifications perceived by it really exist.*

Proof. To say that the inner sense is not reliable in its perceptions, is the same as to say that those identical affections, or inner modifications of the animal body, which are perceived, do not really exist. But this cannot be said without absurdity; for 'to be perceived' means 'to be that which is perceived' or 'to exist as the object of perception.' If, then, those affections did not really exist, they would 'exist and not exist'; which is absurd.

141. **Objections:** 1. The inner sense sometimes testifies to the feeling of a pain in an amputated limb. *Answer.* It testifies to the feeling of a pain, we grant, and there really is a pain; but it does not testify to the exact cause of that pain. The feeling experienced now may be similar to that experienced before the limb was amputated. Then the feeling of pain arose from some lesion in that limb; and now, the imagination reproducing this former relation, affords us an occasion for judging that the present sensation is again owing to the limb which is no longer there. We feel a lesion, which we may be inclined, by the force of habit, to locate in the amputated limb, whereas the nerves are affected elsewhere, namely at their extremity, which is exposed and very sensitive.

2. The inner sense fails to report all affections. *Answer.* We simply maintain that those affections exist which it does report.

3. The proof supposes that the inner affections are really felt and therefore must really exist; but perhaps we

only imagine that we feel them. *Answer.* We know by consciousness that we can imagine a certain pain, for instance the pain of burning, and that we can feel that pain, but that there is a vast difference between these two acts.*

§ 2. *The Outer Senses.*

142. We stated before (No. 102) that we perceive objects outside of us by the five outer senses of sight, hearing, smell, taste, and touch. **Two very different questions** present themselves on this subject: 1. How far is the testimony of our external senses reliable? 2. How do the senses work so as to give us reliable testimony? The full treatment of the latter question belongs to Psychology, that of the former to our present study of Critical Logic. We are absolutely certain of many facts, though we cannot satisfactorily explain how they are brought about: a man exhausted with hunger and fatigue is absolutely certain of the pleasure and the restoration of strength which he derives from a wholesome meal, although he cannot explain the exact process by which the senses and the digestive power contribute to these results; similarly, all men are certain that the outer senses often give reliable information, though few are able to describe the manner in which this is accomplished.

143. **The obvious facts in the case** are these: (*a*) We have various sensations of outer objects in and by our external senses; (*b*) *We judge the cause of these to exist in bodies, i. e.,*

* The objective reality of both sense-perception and intellectual perception is well expressed in the following words of Very Rev. I. T. Hecker (*Cath. World*, Oct., 1887, p. 6): "To see, if one is not a fool or a lunatic, is to see something. To act on any other view of human life, is to tend to imbecility. This law of objective reality applies to the entire realm of human activity. Life is real. 'Wherefore,' says St. Augustine on the Trinity (book ix), 'it must be clearly held that everything whatsoever that we know begets in us the knowledge of itself, for knowledge is brought forth from both, from the knower and the thing known.'"

in substances distinct from our mind, having extension and peculiar powers of action; (*c*) We adhere to this judgment firmly without fear of error. **We maintain** that our firm adhesion to this judgment is due to the objective existence of bodies, and that therefore our external senses are reliable in their sensations of outward objects.

144. But some philosophers argue that we do not know bodies except by means of phantasms and ideas, which are subjective in us, and which, for all we know, may have no objective reality corresponding to them. These philosophers are called **Idealists.** They are divided into two schools: 1. Fichte, the leader of the **subjective school,** maintains that there exists nothing but his own mind which is ever imagining unrealities: "The *Ego* posits itself." 2. Berkeley, the leader of the **objective school,** makes God the direct cause of our phantasms and ideas.

145. Such speculations, instead of resting on solid facts, as all sciences should do, are in direct conflict with all known facts and with the firmest judgments of all mankind. Every sound mind knows for certain **the difference between real perceptions and mere imaginations**; and unsoundness of mind consists precisely in the inability of some men to distinguish between objective realities and mere phantasms. But there is no likelihood that any philosopher of note ever doubted the existence of bodies. Such as pretended to doubt did violence to their own good sense in order to support some pet theory, by which they earned the name of original thinkers.*

* Hume writes in his *Treatise on Human Nature:* "I dine, I play a game of backgammon, I converse and am happy with my friends; and when, after three or four hours of amusement, I would return to these speculations, they appear so cold, so strained, and so ridiculous that I cannot find it in my heart to enter into them any farther" (vol. i. p. 467). Why did Hume and Fichte write books if they really believed that no readers existed?

146. **Thesis XI.** *By our external senses we really perceive bodies*, i. e., *substances distinct from our mind, extended and resisting.*

Proof. Nothing exists without a reason for it; but there exist in us, as we know by consciousness, (*a*) Sensations; (*b*) Irresistible judgments that those sensations are caused by bodies, *i. e.*, by substances distinct from our mind, extended and resisting; therefore a reason must exist for those sensations and for those irresistible judgments. But that reason can be none other than bodies really existing; therefore they really exist.

We prove the last minor: If that reason were not in the bodies, it would be either, 1. In our minds, as Fichte maintains; or, 2. In God, as Berkeley supposes. No other reason is assigned by our opponents. Now, it is, 1. Not *in our minds.* If it were, we should produce those sensations and judgments necessarily or freely; but we do neither: (*a*) Not freely, for we see, hear, feel, etc., many things which we are totally unwilling to see, hear, feel, etc.; (*b*) Not necessarily; for if we were so constituted that we necessarily elicited false judgments, our intellect would be essentially unreliable; it would be a power, not of knowing truth but of deception and falsification. 2. Not *in God.* Those who admit the existence of God at all, as Berkeley and his followers do, admit that He is the infinitely perfect Being; but a perfect being is essentially truthful and cannot be the source of a universal deception, as He would be if He produced those phantasms and gave us at the same time an irresistible impulse to judge falsely of their cause.

147. **Objections:** 1. An evil genius could produce the deception. *Answer.* We deny this; for the deception, if such it were, would be, not accidental, but natural and essential to man, and therefore it would be essen-

tial to man to judge falsely; and thus universal Scepticism would become reasonable.

2. God would not be omnipotent if he could not directly produce on us all the effects that bodies can. *Answer.* He cannot give us an irresistible propensity to judge falsely; this would be against His own perfect nature, and it would leave us incapable of having certainty, of knowing truth.
3. God does so in visions, *e. g.*, when He made Tobias see an Angel. *Answer.* The Angel had assumed a material body.
4. Sometimes a vision is merely subjective. *Answer.* Then the intellect sees reason to suspect the truth.
5. In dreams we judge irresistibly that we perceive real objects. *Answer.* In dreams we do not examine the certainty of our judgments; we have not that reflex certainty which we are here considering. Besides, in dreams we are not in the normal state of rational beings.
6. Those suffering of *mania a potu* cannot rid themselves, even on reflection, of the perception, as they suppose it to be, of snakes, demons, etc. *Answer.* From the fact that a disordered mind cannot know the truth, it does not follow that a sound mind cannot; besides, they no doubt perceive their own abnormal condition and see reasons, when they reflect at all, to doubt their visions.
7. From any act which is only subjective we cannot infer the existence of the objective reality; but sensation is only subjective. *Answer.* Our sensation is not merely subjective; for it is a perception, and a perception is the subjective act of taking in an object: a perception without an object perceived is a self-contra-

diction: there can be no taking in of nothing. Besides, we invincibly judge that our perceptions are due to objects (Nos. 143, etc.)

148. To understand **how far the reliability of our senses extends**, we have only to examine on what points sensation prompts us irresistibly to elicit judgments. As this is a question of great importance, we shall consider it with some detail.*

1. We may see a painting in the distance and judge it to be a statue; we may judge a sound to come from a greater distance than it does. Do our senses deceive us on those occasions? Not at all: in fact, the sight, as such, does not inform us whether all the parts of the object seen are equally near, as in a painting, or unequally, as in a statue. Neither sight nor hearing, as such, tell about distances: sight deals with color and, consequently, with the outlines of colored objects; hearing deals with sound, of which we perceive countless varieties. Each sense has thus its own **proper object of sense-perception** (*sensibile proprium*). The proper object of sight is *color*; of hearing, *sound*; of smell, *odor*; of taste, *flavor*; of touch, *temperature* and *resistance*. The perception of resistance enables us to distinguish between varieties of surfaces, some of which are noticed to be yielding or soft, others unyielding or hard; some are even or smooth; some uneven or rough; some are bounded by straight, others by curved lines; some extend over a large, others over a small space, etc.
2. As extension, outline or figure, number, etc., are perceptible by touch and sight, they, and in general all

* See *The Old Philosophy and Relativity of Knowledge*, by Henry Brown. (*The Month*, September, 1888.)

those qualities of bodies which are perceptible by more than one sense, are called the **common objects of sense-perception** (*sensibile commune*).

3. Sense does not perceive color, sound, resistance, etc., in the **abstract**; but it perceives something colored, sounding, resisting, etc., in the **concrete.**

4. While by our senses we perceive some concrete body as colored, resisting, etc., **our intellect,** by its power of abstraction, abstracts, or considers apart, various notes or marks of that body, such as 'color,' 'resistance,' 'existence,' 'quality,' 'substance,' etc., and thus forms **abstract ideas**; next, by its power of judging, it compares these ideas and the objects perceived together, and pronounces **judgments,** such as 'this substance is colored,' 'something resisting exists,' etc.

5. **The senses usually assist each other**: the eye beholds what the hand touches; the ear perceives the sound, the eye the figure of the rattle or the string which the fingers move. Thus from earliest infancy we have learned by practice to associate our sense-perceptions with one another and with our intellectual acts; we have perfected our associations of phantasms by inductive reasoning, till we have acquired great readiness to judge of the qualities revealed to one sense by the proper object of another sense. For instance, on hearing a familiar human voice we know the presence and the very expression of countenance of a well-known person; from the fragrance of a fruit we can tell its taste; from the aroma we judge the form of a flower.

6. We see many reasons to judge, and on many points no reason to doubt, that **the senses of brute animals** work in the same way as our own. Brutes perceive

the proper and the common objects of sense; and, as their organs and their instincts are often more perfect than ours, brutes may associate phantasms, derived from various senses, more readily and perfectly than we do, as is well exemplified in the scent of the dog and the cunning ways of the fox.

7. Sense does not perceive substance as such; *i. e.*, as distinct from quality; but still, by perceiving the concrete qualities, it puts us into relation with substance. What is thus intellectually perceived on account of sense, is said to be **indirectly sensible** (*sensibile per accidens*). Brutes do not judge at all, in the proper sense of the word; they merely associate, *e. g.*, the stone thrown with the man who throws it, and they do not always do even that: the dog will often bite the stone itself. The Creator, in His wisdom, has given brutes as perfect a power of associating phantasms as is beneficial to themselves and to man, for whose advantage they are evidently intended.

8. Man both associates and judges; for he has instinct and reason. It is, however, only on occasions of some importance that we stop to consider whether our judgments are well enough founded to exclude all doubt. We find them to be such when, on careful examination, we perceive that they give us evidence of the objective truth. That they may do so with regard to our sense-perceptions, the following **conditions** must be fulfilled: (*a*) We must be conscious that we are in a normal or healthy condition; else we can see reason to suspect the testimony of our senses. (*b*) We must be aware that our surroundings appear normal; *e. g.*, if all around us looked yellow, we should see reason to suspect that our eyes were jaundiced. (*c*)

We must find that our senses are concordant with one another and constant in their testimony; *e. g.*, if a passing glance makes me perceive an unusual appearance, I look again with care, I shift my position to dispel all possible illusion of the sight; or I even apply my hands to touch what excites my surprise.

149. **Thesis XII.** *The external senses, acting under proper conditions, are reliable with regard to their proper and their common objects of sensation.*

The proper conditions here spoken of have just been explained. This thesis defines the extent to which the outer senses are perfectly reliable.

Proof. The senses are reliable in their testimony if they perceive nothing but the objective truth; but such is the case. For, being physical powers, they work necessarily, and therefore they can only perceive the objects presented to them; else they would perceive what does not exist; *i. e.*, that which does not exist would be an object of perception; which is absurd.

150. We do not, then, **claim certainty** for every judgment that is formed on occasion of sense-perception, but only for what the senses really report, *i. e.*, the existence of those sensible qualities which are the proper and the common objects of sensation. The substance itself in which those sensible qualities exist is not apprehended, by the senses, as distinct from those qualities. From the knowledge of the qualities perceived by sense, the intellect judges the nature of the substance in which those qualities inhere. In forming its estimate of that substance, the intellect may often be mistaken; *e. g.*, it may judge that to be an orange which is a lump of wax; it may mistake a picture for a body. But even in such cases the intellect is not led necessarily into error, but it can suspend its judgment till all fear of error has been removed.

151. **Objections**: 1. The senses tell us that sugar is sweet, fire hot, etc., while Descartes and others prove that these qualities are not in the bodies perceived, but in the senses. *Answer.* When we say that sugar is sweet, fire hot, etc., we mean that those bodies have real qualities which produce in us corresponding sensations of sweetness, heat, etc.; both the qualities that are in those bodies and the sensations that are in us are denominated by the same terms analogically. Certainly sugar and fire have real qualities which are causes of our sensations.

2. We know by science that the sun is not exactly there where we see it; here the sight deceives us. *Answer.* We know by the sight nothing but the color of the sun; its place, size, etc., are inferred by inductive reasoning.

3. But even the color of the sun is not such as we see it when modified by the atmosphere. *Answer.* We do not claim certainty except for what we perceive; now, we perceive by the sight the color such as it is when it reaches our eyes; with anything else the sense of sight has nothing to do.

4. But the sight distorts its objects; thus, a square tower appears round in the distance. *Answer.* The sight reports only the colors of the different parts of the tower; all inference as to its shape, size, etc., are conclusions of inductive reasoning, which is often too imperfect to give certainty.

5. By admitting that the senses must be concordant and constant in their testimony, we imply that each sense singly can be mistaken in certain cases, at least for a while. *Answer.* All we imply is that the senses give no sufficient ground for certainty till we have

examined whether all the conditions are complied with.

6. When I see a stick plunged into water, I see it broken where it touches the surface; here my sight deceives me. *Answer.* My sight reports the truth, viz.: that the stick appears as if broken.

7. Then our senses can report appearances only; *e. g.*, that I see the appearance of a man, not that I see a man. *Answer.* Sense apprehends appearances only; but our intellect understands that appearances are accidents which naturally exist in substances. When I see the appearance of a man, I understand there must be a cause for that appearance; and, by attending to all the circumstances of the particular case, my mind soon forms a judgment, often absolutely certain, that on the present occasion the appearance of the man is due to the reality of his presence.

8. That our senses may be relied on, we must first know that the order of nature is constant; but we cannot learn this except from the testimony of the senses; therefore we cannot reason on this subject except in a vicious circle. *Answer.* We deny the major and the supposition that we need to reason at all in order to see the evidence of the common and the proper objects of sense, when the required conditions are attended to. We see color, we feel heat and resistance immediately.

9. A color, odor, taste, etc., may please one man and displease another; therefore different men must apprehend objects differently; therefore all do not apprehend them correctly. *Answer.* The apprehensions are the same, but they do not suit all alike. As the organs of men are substantially alike in structure, with

only accidental differences, we reasonably judge that the apprehensions of all men by sense are substantially the same, with only accidental differences. But the pleasure arising from colors and sounds is mostly due to associations of phantasms and sentiments; thus, orange and green please persons of different parties. Odors and tastes, being intended by the Creator to guide us in the selection of suitable food according to our varying bodily conditions, though identical in kind, will often please one and displease another, according to our several needs, thus displaying the wonderful wisdom with which Providence adapts means to an end.

10. In the Holy Eucharist the senses are deceived. *Answer.* They apprehend the appearances which really exist, and thus there is no deception of the senses.

11. Persons who are color-blind misjudge colors. *Answer.* Rather, they are unable to distinguish colors sufficiently to judge with certainty.

Article IV. Authority.

152. Consciousness and intellect put us into direct communication with objective truth, of which they see the evidence. Their perceptions are called **intuitions**, *i. e.*, visions of truth. It is the same with our sense-perceptions of the proper and the common objects of sense: they, too, give us intuitions or immediate evidence. Reasoning brings evidence to us in a more circuitous way; it gives **mediate evidence.** Such, too, is the evidence of sense-perceptions with regard to all testimony that implies the process of induction; *e. g.*, I have only mediate evidence by my sight of the distances of objects; for any judgment I pronounce on that subject is derived from observation and induction united.

153. **Authority** gives us certainty in a still more circuitous way; for it brings us into communication with truth by means of the statements of other persons. The truth thus reached is said to be *believed*, and authority is called an *extrinsic* motive of certainty. **Belief**, or faith, is Divine or human, according as the authority on which it rests is Divine or human. In Philosophy we are concerned with human faith; and the question to be now considered is, whether the authority of human witnesses can be relied upon to give perfect certainty.

154. **Thesis XIII.** *The testimony of men, under proper conditions, can give perfect certainty.*

The **conditions** required are: 1. That the facts testified to are sufficiently open or accessible to observation; 2. That they are of great moment; else they might not be noticed carefully; 3. That the witnesses are sensible men; 4. That they are either undoubtedly sincere, or, if not, that they are many, of sufficiently different characters, opinions, parties, interests, etc., to exclude all reasonable suspicion of collusion in the support of false statements. *Proof.* That testimony gives perfect certainty which convinces us beyond all reasonable doubt that the witnesses could not have been deceived themselves and did not wish to deceive us. But such is the testimony which fulfils the conditions just stated.

For: 1. *The witnesses could not have been deceived*, since: (*a*) The facts are supposed to be open, accessible to observation; (*b*) They are of great moment, so as to invite careful examination; (*c*) The witnesses are sensible men, who do not act rashly and are not easily imposed upon; and, besides, they are of different opinions, characters, etc., so as not to make a mistake in common.

2. *They do not wish to deceive us;* since either they are known for certain to be sincere, and, of course, such men do

not wish to deceive; or, if not certainly sincere, they are supposed to be many, of different characters, opinions, parties, interests, etc. Now, sensible men do not lie wantonly, especially on matters of importance; and, least of all, would they combine to propagate an important falsehood, unless some common grave interest led them into so disgraceful a crime. But they are supposed to have no such interest in common. There is, consequently, no reason to doubt their testimony.

155. **Objections:** 1. Each witness gives only probability, and no number of probabilities can make up certainty. *Answer.* Even one witness who is certainly intelligent, prudent, and sincere may give perfect certainty; but if the testimony of one or several still leaves special reasons to doubt, the testimony of others may show that the doubt is unfounded in the present case; certainty is thus attained, not by an accumulation of probabilities, but by the elimination of all motives for reasonable doubt.

2. Every witness is free to deceive. *Answer.* We can know from the conditions laid down that, in a given case, there was no actual attempt at deceit. Every man is free to commit suicide, and still it is certain that they will not all do so.

3. History contains many falsehoods. *Answer.* We do not defend all history.

4. At least, we cannot be certain of events long since past, because traditions are gradually changed. *Answer.* We can often be certain of such events, viz., when we know that, in a given instance, the tradition was not changed; *e. g.*, we know for certain that Christ died on a cross; that He rose again; that His disciples preached His Resurrection; that they had no motive to do so if He had not risen; that they laid

down their lives in testimony of their sincerity, etc. (See this argument more fully treated in Schouppe's *Course of Religious Instruction*, p. 6.)

5. At least, no amount of testimony can make miracles certain; for it is physically certain that they never occurred, while it is at most only morally certain that they did. *Answer.* It is not physically certain that they never occurred; all that is physically certain is that nature has no power to produce them, but the Lord of nature has; and it is morally certain that they have occurred.
6. Still, plain men could not assure us that any particular miracle was performed; for they are not fit judges of what is miraculous. *Answer.* Sensible men, even though unlearned, can give reliable testimony about obvious facts, of which learned men will judge whether they were natural or beyond all natural power.

Article V. Common Sense.

156. There are many unwavering judgments or convictions common to all men of sound minds; all these may in a wider meaning be called dictates of **common sense**, *i. e.*, of that sense or intellect which belongs in common to all men. Some of these judgments proceed from the testimony of consciousness, others from the immediate intuitions of identity between two ideas, others from intellect and sense-perceptions combined, others are the obvious deductions of reason from intuitive principles and from the perceptions of the senses. But the term common sense, when considered as a special motive of certainty, is taken in a **more restricted meaning**; it comprises those judgments only, common to all sensible men, which are not immediately or intuitively evident, and which are concerned with the direction of moral conduct.

157. The following are **examples** of common-sense judgments: "There is a sovereign Lord and Master of all things," "His Providence directs human affairs," "We must reverence Him," "We must obey His laws," "He is the rewarder of good and evil," "Our soul will survive our body," "There are rewards and punishments after death," "Children must honor and obey their parents," "Friends must help each other," "Brutes may be killed for the use of man," "Men cannot be killed without just cause," etc.

158. To find how far the judgments of common sense are reliable, we must carefully consider whence they proceed and what evidence they give us of the objective truth. We should not suppose that they proceed from the universal consent of men; men agree because each of them individually forms the same judgments, but each one separately does not form them because all agree: **universality is a character, not a cause** of them.

159. True, we may accept a judgment on the authority of men if their united testimony is known to us; but we are then influenced by another motive of certainty, viz., **common consent.** Thus, we may believe that man is fallen from an originally happier condition, because most nations have traditions to that effect; but the judgments of common sense are very different, being formed by each one independently of the consent of others.

160. Nor should we suppose that the judgments of common sense proceed, as Reid and his followers of the Scottish School maintain, from a mere **instinct to believe** certain truths. These writers wished to refute the Scepticism of Hume by the weapon of common sense; but they failed to establish the reliability of common sense by making it a mere blind instinct.

161. Whence, then, do the judgments of common sense

derive their validity? From the evidence of the objective truth, which is presented with sufficient clearness to every sound mind. The objective truth in such cases is not intuitively beheld; we do not see immediately God's existence, nor the action of His providence; nor the soul as surviving the body, nor one being called virtue and another vice; but, starting with premises supplied by sense-perceptions and intellectual action, we go through an **obvious process of reasoning**, of which the evident conclusions are the dictates of common sense. For instance, my senses seize upon the fact of the world's existence, my intellect sees there must be a reason for its existence; and, not finding that reason in the world itself, my mind concludes by an obvious process of reasoning that there is a first cause of the world, distinct from it; besides, since we also understand that a thing made belongs to its maker, we conceive the Cause of this world as the Sovereign Lord and Master of all things, etc. The judgments of common sense, therefore, are reliable, because they are evident conclusions derived from evident premises.

162. This motive of certainty is, then, not entirely distinct from the motives already considered; but it has a special **advantage**, viz., that it furnishes us with a summary proof of many most important propositions, the detailed study of which would require lengthy explanations.

163. **Thesis XIV.** *The judgments of common sense are true.*

Proof. According to the principles that underlie inductive reasoning (No. 47), any constant, uniform, and unvarying effect produced by any class of objects must proceed from the very nature of those objects; but these judgments are constant, uniform, and unvarying in man; therefore they have for cause the very nature of man: in other words, it is natural or essential to man to form these judgments. Now, it cannot

be natural or essential to man to form false judgments; else universal doubt would follow, which, however, has been proved to be absurd; therefore these judgments are not false, but true.

164. **Objections**: 1. Such judgments may have come from tradition, education, prejudices, human laws, etc. *Answer.* The effect cannot exceed the cause: all these causes are variable among men, except just so far as they can be traced to the very nature of man. Besides, mere traditions, etc., would not impose on the consciences of all so stern a sense of duty as belongs to the dictates of common sense.

2. These judgments might come from the passions of men. *Answer.* On the contrary, our passions would rather prompt us to deny these very judgments.

3. Huxley says that religion has been developed from men's instinctive belief in ghosts. *Answer.* Huxley's theory is, as usual with him, a mere theory unsupported by valid proof. The very fact that so determined and able an opponent of religion cannot adduce any more plausible theory to account for the conviction of mankind, is a strong presumption in favor of our thesis.

4. Ignorant men cannot reason well enough to form such judgments; therefore they only receive them from others. *Answer.* The reasoning in question is not difficult, but easy and obvious; though it is not pretended that every mind can give a philosophic account of its own reasonings.

5. Even great geniuses do not always see those conclusions. *Answer.* Geniuses often strive after originality of thought more than after truth, in order to make themselves a name; proud minds disdain to follow the beaten path, simply because it is the beaten path. (See further *Metaphysics*, No. 225.)

CHAPTER IV.

THE ULTIMATE CRITERION OF CERTAINTY.

165. The various sources of certainty, examined in the preceding chapter, furnish us *motives of certainty*, *i. e.*, reasons which move our intellect to elicit firm undoubting judgments. But these several sources do not give certainty except when properly applied to their proper objects; *e. g.*, our senses are not reliable except under the proper conditions. Hence, to have philosophic certainty in any given case, we must examine whether in that case all the necessary conditions have been complied with, and whether no reason remains to entertain any further doubt. For this purpose we need a rule or test by which to judge our very judgments; to ascertain beyond the possibility of error that they are conformable to the objective truth. This rule to judge by is called a **criterion** (*κρίνω*, I judge) of certainty.

166. We maintain that **the ultimate and universal criterion of certainty** is *the evidence of the objective truth.* By calling it *ultimate*, or *last*, we mean that, when this criterion is applied, it leaves no room for further inquiry concerning the existence of certainty; the ultimate criterion answers the last question that we can or need ask in examining the reliability of our knowledge. For instance, if I question myself how I know that bodies exist, I answer that I see and feel them, that by my senses I perceive their existence, and I cannot perceive that which does not exist as an object of perception; in other words, their existence is made evident

to me. If asked why I am certain that the Declaration of Independence occurred in the United States, I answer that I have learned it from reliable witnesses. And why do I believe these witnesses? Because my reason convinces me that their testimony is reliable. But why do I rely on my reason? Because it gives me evident conclusions from certain premises. I can question no further, because I can wish for nothing more evident than evidence.

By calling evidence the *universal* criterion of certainty, we mean that evidence is the crucial test in *all* cases of natural certainty; for it is with natural certainty alone, not with supernatural Faith, that Philosophy is concerned.

167. **What, then, is evidence?** It is important to understand it well, since all certainty is ultimately to be tested by this criterion. As stated above (No. 84), in the analysis of certainty we find that the firm adhesion of our mind to a truth, excluding all fear of error, is the *subjective* element of certainty; and the manifestation of the truth to the mind producing this firm adhesion, is the *objective* element. Now, such manifestation is the evidence of that truth. Evidence is to the mind what the visibility of a body is to the eye. That I may see a body, 1. It must exist; 2. It must give forth, or at least reflect, rays of light; 3. By that light it must impress itself on my eye. So, likewise, that a truth may be evident to me, 1. It must exist; 2. It must shine forth by its intelligibility, as all truth does, for ontological truth is the intelligibility of a thing; 3. Its light or intelligibility must be so presented as to force itself upon my intellect, making me see that the thing is so and must be so, cannot be otherwise. Hence a usual and correct **definition of evidence** is "such a manifestation of a truth as makes us see that the thing is so and cannot be otherwise," or, more briefly, "the manifest necessity of a truth." We do not mean here that the

objective truth is *absolutely* necessary, but only that, *if* I see it, it *must* be, else I could not see it; the truth is *hypothetically* necessary.

168. Before Descartes' time, the fact that evidence is the ultimate criterion of certainty was scarcely disputed; but this writer has so confused the question of certainty that many modern philosophers have assigned and defended false criteria. Descartes himself considers *clear ideas* as the great test or principle of certainty; while Reid, and the Scottish School generally, rely ultimately upon what they call *common sense*, by which they mean a blind instinct to consider a thing as true. But they should prove that such ideas or such an instinct is necessarily a pledge of the objective truth. In fact, these criteria are all internal; now, **no merely internal test** can settle the question whether the external things exist, since it is not necessarily connected with the objective truth.

Others look for the criterion in a merely external rule. Thus, De Lamennais, indignant that human reason had been adored in France during the Reign of Terror, strove to discredit reason and to show that we cannot trust our reason, but must test its reliability by comparing its judgments with the *common consent* of men. But how can we know that men are agreed upon any point, unless we can rely on our senses and our reason to ascertain whether men exist and what they say? **No merely external test** can be ultimate; for we need a further criterion to judge of its existence and its reliability.

169. **Thesis XV.** *The evidence of the objective truth is the ultimate and universal criterion of certainty.*

Proof. It is such if it fulfils the following conditions: 1. To be *a reliable test* of truth, the criterion must be inseparable from the truth, so that it cannot exist without the truth. 2. To be *ultimate*, it must leave no doubt to be removed by a further test. 3. To be *universal*, it must be applicable to

every motive of natural certainty. Now, the evidence of the objective truth, and it alone, fulfils all these conditions: 1. It cannot exist without the truth, since it is the intelligibility of the truth itself made manifest to us. 2. It leaves no doubt to be removed by a further test, since it enables the mind to see the necessity of the truth manifested to it. 3. It is universal, for in no case have we real certainty unless we see that the truth is so and cannot be otherwise; but this supposes the evidence of the objective truth, and is nothing else than the perception of that evidence. Therefore this evidence is the ultimate and universal criterion of certainty.

170. **Objections**: 1. We cannot be certain of anything unless we know that others agree with us. *Answer.* We deny this. In fact, we could not know that others agree with us if our own faculties were not reliable, capable of seeing the evidence of that agreement.

2. We cannot know that we are not insane except by ascertaining that others agree with us. *Answer.* This, too, we deny. Besides, even an insane man cannot err when he has evidence; but he has not evidence in the matters wherein he is insane; for evidence is a manifestation of the truth. It must, besides, be remembered that we claim certainty for man in his normal state, not for crazy, drunken, or sleeping men; and the very reason why these cannot be certain is because they cannot reflect sufficiently to examine their judgments: they imagine that things are so, but they cannot *see* that things cannot be otherwise.

3. Evidence is only in our minds. *Answer.* True evidence is the light of objective truth perceived by our minds; that which is not cannot be perceived.

4. We cannot be certain that we have evidence. *Answer.* We can, as our consciousness testifies.

5. Every man is fallible. *Answer.* Not about matters that are evident.
6. We have no infallible knowledge except through Revelation. *Answer.* We have; and we could not rationally trust a Revelation if we had no evidence that it was made: those who attack the reliability of our reason thereby attack the foundation of Faith.
7. God is the ultimate motive of certainty. *Answer.* He is the first being existing and knowing, but not the first being known to me: His existence is first ontologically, not logically, with regard to me.
8. Consciousness is the ultimate criterion of certainty; for it answers the last question asked about the motives of certainty. *Answer.* We trust our consciousness because it is evidently reliable, thus evidence is the ultimate criterion.
9. Evidence itself requires attention and examination. *Answer.* As motives of assent, no; as necessary conditions for the existence of subjective evidence, yes.
10. Evidence does not reach all kinds of truth; for instance, we have no evidence of what we learn from witnesses. *Answer.* We have no intrinsic evidence of it, but extrinsic, *i. e*, we have evidence that the witnesses could not deceive us.
11. An evident conclusion may be false. *Answer.* Not if the whole reasoning is evident, premises and sequence.
12. It is the part of Protestantism to make one's own judgment the criterion of all certainty. *Answer.* Protestantism errs in making private judgment the criterion of supernatural certainty.
13. Many truths are certain, but not evident. *Answer.* Of natural truths all that are certain are either intrinsically or extrinsically, directly or indirectly, evident to man's natural powers.

MENTAL PHILOSOPHY.

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INTRODUCTION.

1. The word **Physics** means etymologically the study of nature (φύσις, nature); but even the ancient Greeks restricted the meaning of the term to the sensible or phenomenal properties of the material world. At present the meaning of Physics is still more limited: it now denotes that branch only of the Natural Sciences which explains the sensible properties of *bodies in general*, and the causes (such as gravitation, heat, light, magnetism, etc.) which modify those properties. It is thus distinguished from the sciences of Astronomy, Chemistry, Biology, etc., which deal specially with the sensible properties of only certain classes of bodies.

2. **Metaphysics** is the science of whatever is not sensible, of what lies beyond the reach of the senses, as far as it is cognoscible by human reason. It belongs to the *genus* science,—*i. e.*, the certain and evident cognition of things by their causes; and it is the highest among the purely human sciences, for it traces its knowledge to the highest causes accessible to human reason. Its *specific difference* lies in dealing with whatever is beyond the reach of the senses, the non-sensible being its formal object; whether this be found in spiritual beings, totally beyond the reach of sense, or in material things in as far as these do not affect the senses.

3. What sensation cannot perceive is the formal object of our mind or intellect, the special functions of which are

abstraction and generalization; therefore *abstract and universal knowledge, as such,* is the **formal object of Metaphysics.** Hence this science, being distinctively intellectual, is also denominated 'Intellectual Philosophy,' or 'Mental Philosophy'; while the application of these abstract truths to the moral conduct of men is styled 'Ethics,' or 'Moral Philosophy.'

4. **Metaphysics is divided** into two parts: 1. **General Metaphysics** studies the non-sensible in general, its principal object is 'being,' as such; it is therefore called **Ontology,** or the science of being (*ὄντα,* beings). 2. **Special Metaphysics** studies what is peculiar to special classes of beings; it comprises *Cosmology,* which treats of the material world (*κόσμος,* the world); *Natural Theology,* which treats of the knowledge of God (*Θεός,* God), as far as He is knowable by merely natural means; and *Psychology,* which treats of living things (*ψυχή,* the vital principle), especially of the human soul. Metaphysics does not treat professedly of the Angels, because their existence is not known to us except by Revelation. Some modern Metaphysicians, confining Psychology to the study of the human soul, treat separately of organic bodies under the title of 'Organology,' or 'Biology' (*βίος,* life). Others consider all that is peculiar to man under the head of 'Anthropology.' The division which we have given above is the oldest and, even now, the most commonly adopted.

BOOK I.

GENERAL METAPHYSICS; OR ONTOLOGY.

5. **Ontology** is the science of 'being.' It examines: 1. The nature of being. 2. The transcendental attributes of being. 3. The Categories, or highest genera of beings. 4. The most important link that unites all classes of beings, viz., the relation of cause and effect. 5. The most important perfections of beings.

CHAPTER I.

THE NATURE OF BEING.

6. We shall consider: 1. The meaning of the term 'being.' 2. Possible being in particular. 3. The essence and the existence of beings. 4. The primary philosophical principles derived from the study of being.

ARTICLE I. THE MEANING OF THE TERM 'BEING.'

7. The term **being**, when used as a participle, is a synonyme of 'existing'; as a substantive it expresses the one mark or note common to all that can become the object of thought. It is not, then, confined to *actual* being, but it includes also *possible* being; for we can think, *e. g.*, of golden stars, and

other things only possible. It is not confined to substances, but is also applicable to accidents and relations; *e. g.*, we can think, not only of a tree, but also of its vitality, its color, its age, etc. Even a mere negation, *e. g.*, darkness, may be called being, because we can think of it. Yet, because we cannot think of it except by way of negation of something else—darkness denoting the absence of light—such an object of thought is not called a real being. But we call a **real being** whatever may be known or thought of positively and by itself, whether it is actually existing or only possible,—*i. e.*, capable of existing. That which is not a real being, but the absence of a real being, is a **mere figment of reason,** or *ens rationis*, as it is called by the Schoolmen. This same term is applied to whatever is intrinsically impossible, *e. g.*, a square circle.

8. Real being, viewed as such, is the **formal object of Metaphysics.** In English, the word 'thing' is used as an exact synonyme for real being, except when it is taken in a special sense as opposed to persons, as when we say 'persons and things.' Thus, we say a tree is a thing, its size is something, its fertility is something; blindness is not a real thing, but the absence of something real, etc.

9. Being is called a **transcendental,*** *i. e.*, a note common to all things, and thus transcending any genus or species. Still, it must be noticed that when we say 'a tree is a being,' 'its color is a being,' 'its age is a being,' etc., we evidently take the word 'being' in senses somewhat different from one another; the term being is not taken *univocally* but *analogously.*

10. The **analogy** in this case is not that of mere *proportion* or resemblance; for there is more than resemblance

*Kant attached a new meaning to the term 'transcendental,' viz.: Whatever is beyond the reach of experience. He has thus created a confusion of ideas in many minds.

between the meanings of being; there is identity to a certain extent; it is the analogy of *attribution.* It is called *intrinsic*, because the note expressed by 'being' is contained in every being, and not merely attributed to one owing to some extrinsic relation with another being. But the mere *ens rationis* is called being by an analogy of proportion only, not of intrinsic attribution.

11. We must also distinguish between a *physical* and a *logical* being. Both may be real beings, but analogously. **Logical** being is being viewed as a mere object of knowledge, and therefore it can exist in the mind only, *e. g.*, all universals, all abstract ideas. **Physical** being can exist out of the mind, *e. g.*, this house, two houses, the Angel Gabriel, etc. Still the mind itself has also physical being, and so have its acts, viewed as modifications of the mind; but the terms of its acts, mental terms, have only logical being. All physical being is real being; a logical being is real when it is not an *ens rationis.*

Logical, as distinct from physical being, is the object of Logic.

12. A third distinction lies between *actual* and *possible* being; **actual** here means 'existing,' and **possible** means 'capable of existing.' Both actual being and possible being are real being, provided they be not negative.

13. **Thesis I.** *The term being does not express a genus of which the different classes of beings are the species. Proof* 1. A genus is univocally predicable of all its species; but being is not univocally predicable of all classes of beings, as we have explained (No. 9); therefore being is not a genus of which the different classes of beings are the species. *Proof* 2. If we examine with care how individuals are classified into species, and these into a genus, we shall perceive that the note which constitutes the difference between the

species is a something added to the genus, and not included in the notes which constitute that genus, *e. g.*, 'rational,' which marks the difference between rational and irrational animals, is not contained in the genus animal, but added to it in man and not added in the brute. Therefore, if 'being' were a genus, the difference that would be added to it in order to make a species would be something distinct from it, something not being. But there is nothing which is not being. Therefore no such difference can be added. Therefore being is not a genus; it may at most be called a *quasi-genus*, as bearing some resemblance to a genus.

14. Since being is not a genus, different classes of beings, *e. g.*, substance and accident, finite and infinite being, etc., are not species of beings; but they are called **determinations of being**,—*i. e.*, when I think of a substance, I do not think of a being with something else added to it, but of a being more clearly or less vaguely understood. As when a man looks through a telescope and vaguely discerns something, he knows not what; then, after focussing his instrument and looking again, he sees the same thing, recognizing it to be a ship, and such an individual ship; so when we see being as substance, we see no more than being, but we see it more distinctly; in short, being has not received an addition but a determination. (See this matter fully explained in the excellent work of Rev. Thomas Harper, S.J., *The Metaphysics of the Schools*, vol. i., Props. IV., V.)

15. **Thesis II.** *The idea of being in general is not the idea of the Infinite Being.*

Explanation. This thesis is a most important application of the abstract truths so far considered. It strikes at the root of a philosophic system advocated by the Ontologists, whom we shall refute more directly in our treatise on Psychology (Nos. 187, 188).

Proof 1. The idea of being in general is very indefinite, that of the Infinite Being, or God, is very definite; for the former denotes any being, no matter how imperfect, the latter the union of all perfection in one Being.

Proof 2. Being in general is an abstraction, having only a logical entity; for no being can have physical existence except as a singular concrete being. Now, the Infinite Being has physical and concrete existence, existing not in general, but in an individual nature.

Proof 3. Being is not even predicated univocally of God and of any creature, but only analogically; because the being of all other things is distinct from their actual existence, for other beings may be actual or possible; whereas in God it is not distinct from existence, for a possible God would be no God at all.

True, the scholastic term *ens simpliciter*, 'simply being,' is predicated of God and of being in general, but in different significations; God is simply being, *i. e.*, being without any non-being; being in general is simply being, *i. e.*, being without specification.

How, then, do we get the idea of infinity? We perceive beings which have a certain amount of perfection and no more; we distinguish between perfection and limit, or the absence of further perfection; next, by our power of abstracting, we mentally remove all limit, and thus conceive abstractedly perfection without limit, *i. e.*, infinity.

16. **Objections:**

1. The idea of God is the first idea, but the idea of being in general is the first idea which our mind conceives; therefore, the idea of God and that of being in general are the same. *Answer.* Our idea of God is our idea of the first being, but it is not our first idea: God is first in the order of being or

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ontologically, but He is not first revealed to our knowledge, not first logically.

2. God is the first truth. *Answer.* In Himself, yes; the first truth known to us, no.
3. From the finite we could never form the idea of the infinite: therefore we see the infinite directly. *Answer.* From the finite we could not form the intuitive perception of the infinite; but we can, by mentally removing all limits, form the abstract concept or idea of the infinite.
4. We could not understand what finite means unless we first understood the meaning of infinite; for the finite is only the negation of the infinite. *Answer.* The finite is not the negation of the infinite: it is the complex notion of 'being with limits'; now we see both 'being' and 'limits' all about us, we have only to conceive and unite those two notes in order to conceive the idea of finite.
5. If God is not admitted to be our first idea, we cannot prove the objective reality of our knowledge. *Answer.* In Critical Logic, the objective reality of our knowledge is proved without such admission.

Article II. Possible Being.

17. A being is **possible** if it can exist. Possibility is twofold: *intrinsic* and *extrinsic.* A thing is **intrinsically** or internally possible if the notes of which it consists do not exclude one another; thus a mountain of jewels is possible, but a square triangle is impossible.

A thing is externally or **extrinsically** possible when there exists a power that can produce it; now, because the power of God is infinite, everything that is intrinsically possible is also extrinsically possible to God.

18. That which can be produced by no created power is said to be **physically** impossible. We call an act **morally** impossible when it might, indeed, be done by man, but, considering the uncommon difficulty of the act and the weakness of man, it would scarcely ever be done. Thus, it is morally impossible for a man to be always so careful as never to make any mistakes.

19. We get **our knowledge of what is possible** from the consideration of what is actual. Our imagination can combine various phantasms of material things perceived into new phantasms of things imaginable. Our intellect can combine notes of actual things which have become known to us, and form from them new concepts of merely possible things; but neither the imagination nor the intellect can combine elements that contradict each other; thus, we can neither imagine nor conceive a triangular circle.

20. **God's knowledge of possible creatures** is not derived from the consideration of actual creatures; but, understanding His own essence adequately, He saw from eternity how it could be imitated, or represented, by an endless variety of creatures. His infinite wisdom thus formed in itself the *exemplars* of all possible things, in a manner analogous to that in which an architect conceives the plans of various structures which he can erect. Thus, all things have not only their existence from God when they are created, but even their intelligible nature before creation; for God's intellect plans them.

21. **We do not intuitively behold the exemplars** as they are in the mind of God; but, when we conceive possible things, our concepts are conformable to those exemplars, except, of course, when our concepts imply a false judgment. The reason is that both God's concepts and ours are founded upon the same truth, viz.: that the notes which make up a possible

being can exist together. Various false views have been taken of these possibles by various philosophers, whom we shall now refute.

22. **Thesis III.** *The internal possibility of things does not formally depend on the power nor on the will of God.*

Proof. To say that the internal possibility of things depends formally on the power or on the will of God would mean that God's power as such, or His will as such, determined the difference between what is possible and what is impossible. But this cannot be.

1. God's *power* cannot determine the difference between possible and impossible; else certain things would be impossible simply and formally because the power of God did not extend to them, and thus the power of God would be limited.
2. God's *will* cannot determine this difference, else He could will the impossible to be possible; He could will that notes which contradict each other should nevertheless exist together, *e. g.*, that a circle should be square, that a truth should be false, that a thing could 'be and not be' at the same time; thus all certainty would vanish and universal scepticism would result.

23. **Objections:**

1. If God cannot make the impossible possible, He cannot do all things. *Answer.* This we deny; *an absurdity* is not a thing, a real being; *e.g.*, a triangular square would be a square that is not a square, but this is not thinkable, not intelligible, not a real being (No. 7).
2. Then God in creating would not be independent, He would depend on the possibles. *Answer.* The possibles themselves depend on His wisdom, and thus His dependence would not be on any existing being except Himself, for the possibles have no existence.

3. Then God would not create things out of nothing, but out of their possibility. *Answer.* He creates things out of nothing, actual or pre-existing; for the possibility is nothing actual, nothing existing.
4. If possibles have no existence, how can God know them? *Answer.* From eternity He knows His existing essence as capable of being imitated by beings which do not exist from eternity.
5. If it were not for the power and will of God, nothing were possible; therefore the possibles depend on His power and will. *Answer.* Nothing would then be *externally* possible; we grant that the external possibility of things depends on God's power and will.

24. **Thesis IV.** *The internal possibility of things depends on the intellect of God.*

Proof. The internal possibility of a thing consists in the agreement between its notes; not an actual agreement between actual or existing notes, but a merely logical agreement between notes considered as possible. Now, whatever is merely logical being depends on an intellect which conceives the notes and the agreement between them; therefore the internal possibility of a thing depends on an intellect; and since all things internally possible were so from eternity, their possibility depends on an eternal intellect, *i. e.*, on the intellect of God.

25. **Objections:**

1. Even if we supposed that God did not exist, a round circle would still be internally possible. *Answer.* (*a*) From an absurd supposition it is no wonder if we get any consequence. (*b*) Nothing would be internally possible if there were no mind to conceive notes and associate them.
2. We can think of possibles without thinking of God;

therefore they do not depend on God. *Answer.* We cannot fully understand them without referring them to the intellect of God. From the fact that we do not always think of them as dependent on God, it does not follow that they are not dependent on Him, but simply that we view them imperfectly.

26. **Thesis V.** *The internal possibility of things depends on the essence of God.*

Proof. God, being infinitely perfect, cannot be dependent for the knowledge of His intellect, except on Himself, on His own essence; but He knows all possible things; therefore, He must know them in His essence; but He does not know them as existing in His essence; therefore, He can only know them as having their source in His essence, as dependent on His essence; therefore, they depend on it.

Are, then, the possibles the Divine essence? No; the possibles, as such, or formally considered, have no actual entity, and therefore they cannot be the Divine essence, which has actual entity. But whatever foundation there was from eternity for the formation of these logical concepts, that foundation must have been something actual, and, therefore, identical with the essence of God.

27. **Objections:**

1. God must then have an infinite number of these concepts; but an infinite number of existing things is absurd. *Answer.* God understands all things by one concept, which embraces all that is knowable. Even we, in one concept of a line, embrace any number of parts into which it may be divided. The possibles are numberless (see No. 38); and they are not existing things, as the objection supposes them to be.
2. This explanation makes all things part of God's essence, and thus leads to Pantheism. *Answer.* It

makes all things finite imitations of God's infinite essence.

3. Knowledge supposes its objects and does not make them; hence the Divine intellect supposes the possibles and does not form them. *Answer.* The knowledge of the architect supposes his knowledge of the materials which he is to combine in his plans; thus, also, the intellect of God sees all perfections in His own essence, and understands how imitations of those perfections can be variously combined in finite beings.

Article III. Essence and Existence of Beings.

28. The **essence** of a being is that collection of notes which must be conceived to understand that being, because they make it what it is and distinguish it from every being of another species: the essence (from *esse*, to be) answers the question, 'What is it?' '*Quid est?*' and is also called the 'quiddity.' For instance, the essence of a syllogism is "an argument consisting of three propositions so connected that from two of them the third follows." If any one of these notes is wanting, we have no syllogism, and if any of them is not apprehended, we do not apprehend the syllogism.

29. In its **widest sense**, the term essence is applied to anything, be it substance, property, or accident; for everything has notes which make it what it is, and about everything we can ask, 'What is it?' *e. g.*, What is color? what is figure? what is time? etc. But in a **stricter sense**, essence is said of substance only, and expresses the species to which that substance belongs; *e. g.*, the essence of man is rational animal, or a being composed of body and soul.

30. The essence of a substance may be viewed in two

ways: 1. The real or **physical essence** is the essence as it exists in the substance independently of our way of conceiving it. We conceive the physical essence when we conceive a being as composed of those elements which are really distinct in that being; and we express that physical essence by mentioning the parts really distinct, as body and soul in man. 2. The notional or **metaphysical essence** is the essence conceived as made up of parts which are not really, but only logically distinct. It is expressed by mentioning qualities which do not correspond to distinct parts; as when we call a man a rational animal. For we must not suppose that the animal and the rational are two distinct parts that make up man, as body and soul do, but the animal itself is rational; and if the rational part of man be taken away, there remains not an animal but an inanimate body.

31. **Are essences eternal and immutable?** In their physical existence, essences are not eternal, but created in time; but they may be called immutable, inasmuch as they remain while the substance lasts, for the accidents alone are changed. In their logical entity or intelligibility, essences are eternal and immutable, inasmuch as it ever is and ever was true, *e. g.*, that an intellect supposes a simple substance, that a part is less than the whole, etc.

32. It is clear that **we know the essences** of the things which we make or invent ourselves, as of a watch, a table, etc. We also know the essences of many things in nature, as of a fruit, a tree, an animal, the intellect, etc.; else, we could have no science about such things, since science treats not of singular things but of the essences of things. Still there are many natural agents of which we do not know the specific essences, *e. g.*, heat, electricity, magnetism, etc.; we know what they do, but not what they are. We define

such things by mentioning a genus to which they are known to belong, and, as the difference, we mention the effects which are peculiar to them; thus, we know that electricity has the power to produce certain effects, but we do not know whether it is a distinct substance or a modification of a substance; if it is a distinct substance, we do not know whether it is simple or compound.

33. **Existence** is a simple and primary concept, which, therefore, cannot be defined; the word is said to come from *ex-sistentia*, a standing forth out of its causes. By receiving existence, a possible being becomes actual; *e. g.*, Plato was possible and became actual. Are, then, existence and actual essence the same? This question is usually answered thus: "Between actual essence and its existence there is no real distinction, but only a logical distinction founded on reality." (See Harper's *Metaphysics of the Schools*, vol. i., Prop. XVI.)

34. The essence considered as the principle of actions is called the **nature** of a being. If, therefore, the actions of a being are sufficiently known, and are found to be uniform and constant, we can safely infer attributes belonging to the nature and essence of that being; thus, from the intellectual acts of man we infer the simplicity of his soul. The knowledge thus acquired is true and certain, for it rests on the evident principle that there must be a proportion between an effect and its cause. Therefore Locke and the positive philosophers are entirely mistaken when they teach that we know nothing but phenomena or sensible facts; we know that those facts can only proceed from proportionate causes, and thus from their effects we know something of the natures and essences of these causes.

ARTICLE IV. THE FIRST PRINCIPLES DERIVED FROM BEING.

35. From the very concept of being we derive analytically three primary judgments or **first principles of reason**, viz.:

1. The principle of *identity:* 'That which is, is,' or 'the being is.'
2. The principle of *contradiction:* 'A thing cannot be and yet not be,' or 'Being is not non-being.'
3. The principle of *the excluded middle:* 'A thing either is or is not.'

It is **a disputed question** whether the principle of identity or that of contradiction should be called the first principle. The two are inseparable, and, when properly understood, imply each other; for when we say, 'That which is, is,' we imply that it cannot not be, and when we say that being is not non-being we imply that it is being. There is no judgment prior in nature to these two, for every possible judgment contains these, and these imply no other judgments.

CHAPTER II.

THE TRANSCENDENTAL ATTRIBUTES OF BEING.

36. An **attribute** or **property,** *strictly* so called, is some note which is not the essence but still necessarily flows from the essence. Now, it is evident that from the essence 'being' nothing can flow which is not itself 'being'; therefore 'being' cannot have attributes or properties in the strict sense of these terms.

But in a **wider sense** we may, by analogy, give the name of attribute or property to any special view taken of being, provided such view can be taken of all and every being. Now, three such views are possible: (*a*) We may deny of every being that it is divided in itself; we do so by saying that it is *one;* oneness or **unity** is intrinsic to every being, and since it denies division it is a negative attribute. (*b*) Considering a being extrinsically, or as related to other beings, we may view it as conformable to knowledge, and call it *true;* **truth** is an extrinsic positive attribute. (*c*) We may also view every being as proportionate to an appetite or desire, and call it *good;* **goodness** is therefore also an extrinsic positive attribute. We shall find no other property which is common to all beings and is not identical with one of these three. These, then, are the only three transcendental properties of being; we shall examine them separately.

37. I. **Every being is one.** The term 'one' adds nothing positive to the being of which it is predicated, but it excludes the idea of many or of division into many; that therefore is called 'one' which is not many, which is not divided in itself.

It differs from 'alone,' which term has reference to something else, denying the existence of another being of the same kind. Still, unity is not always taken in its transcendental sense. When not taken in a transcendental meaning, but as a predicable, **unity may be differently considered.**

1. It is *metaphysical* when the being is not only undivided, but also incapable of division, as a spirit.
2. *Physical*, when nature unites real or separable parts into one whole, as in a tree, a man, a stone.
3. *Artificial*, when the parts are united by human skill, as a table, a clock, a book; this unity may be material or mental. Thus, a history in several volumes is an intellectual or mental unit.
4. *Moral*, when persons are united by a moral bond, as a family, a state.
5. *Accidental*, when the union is a mere aggregation without a bond, as a heap of stones. A being may have one of these unities without having the others. Metaphysical and physical unity make a being one in the proper sense of the word; the other unities make a thing one after a fashion, *secundum quid.*

38. The opposite of 'one' is 'many'; the opposite of unity is **multiplicity.** Many taken together constitute a multitude. A multitude measured by the unit is called a number. To number a multitude we must conceive three things: 1. *Oneness*, for number is formally a collection of units. 2. *Distinction*, or division between the units. 3. Some *similarity* between them. If that similarity is generic or specific, we have a **concrete number**, as five animals, twenty men, etc. If the similarity is only transcendental, we have an **abstract number**, as five, twenty, etc., *i. e.*, so many beings. Thus, also, five men, four plants, and five senses make fourteen things. When we have no definite unit to start with, we

can get no number; thus the arcs contained in a circumference are numberless. Since oneness, distinction, and similarity are conceived by means of abstraction, and abstraction requires an intellect, none but intelligent beings can count. Brutes may perceive many things, but they cannot perceive them as making a number.

39. The unity which a being has with itself or with another is called **identity** or **sameness.** When a being is viewed as the same with itself individually, it is said to be *numerically* identical; when as the same in species with another being, it is *specifically* identical; when as the same in genus, it is *generically* identical. Thus we say that two stone houses are of the same material (generically), two houses built of granite are of the same material (specifically), and when a house is taken down another may be built of the same material (individually).

When a thing ceases to be physically the same, but remains the same in the estimation of men, we denominate the sameness as *moral* identity; thus, a house might be called the same building, though all the parts one after another have been renewed.

40. To identity is opposed **distinction,** which means that one thing is not another. All distinction is either *real* or *logical.* 1. The **real distinction** is between the things themselves, independently of the manner in which the mind apprehends them. It is called a *major* or greater distinction when it is between species, as between man and brute; or between individual substances, as between Cæsar and Cicero; or between parts that can exist separately, as soul and body. The distinction between a substance and its accidents, as between a tree and its size; or between the accidents, as between the color and the taste of an apple, is by some called major, by others minor. The *minor,* or lesser distinction, also called

modal, exists between an entity and its mode. Now, by a mode we mean a manner of being that cannot possibly exist without something of which it is the mode; *e.g.*, figure, for there can be no figure without some quantity that has that figure. 2. The **logical** or mental distinction is between two ideas. It is *purely logical* when the ideas are exactly equivalent, as between a definition and the thing defined. The logical distinction is said to be *virtual*, or *to have a foundation in the reality*, when the concepts are not exactly equivalent, as when I distinguish the reason from the intellect of man, the mercy from the justice of God.

41. Under the head of unity we must also explain **individuality.** It is that unity of a being which makes it precisely this or that being. But what is it that thus individualizes a being? It is not the accidents; thus, a man, for instance, remains the same individual throughout his life, though his accidents are constantly changing, and two grains of sand exactly alike are yet not the same individual grain. St. Thomas puts the principle of individuation in matter, because "matter is incapable of being shared by several beings" (*De Ente et Ess.*, c. v.); and he adds that angels, or separated forms, as he calls them, are not individualized except by their specific notes, so that every Angel is a species by himself. Suarez, on the other hand, puts the principle of individuation in the form. Father Harper suggests that everything, be it matter or form, or compound of both, is intrinsically individualized by its own actual entity, and needs no other note; and thus that everything physically existing, or proximately apt to be brought into existence, is thereby individualized without needing any further principle to give it individuality. (Harper's *Metaph.*, vol. i. pp. 208 to 290.)

42. II. **Truth**, viewed as one of the transcendental properties of being, is metaphysical or ontological truth.

(*Crit. Log.*, c. i. a. i.) It means cognoscibility, or conformity of being to knowledge. As the form of a building is determined by the mind of the architect, so all creatures have their being and cognoscibility from God's intellect. The knowledge of God is therefore the *norma*, or *measure*, by which all created things are measured; while we derive our knowledge from creatures, and therefore these are the measure to which our knowledge must be compared in order to be true. Since God cannot fail of creating what He wants to create, the creature is conformable to His knowledge, and thus there can exist no metaphysical falsity. Things are called *false* only by analogy, inasmuch as some circumstance connected with them is apt to produce logical falsity in our mind. While truth is predicated both of knowledge and of being, still it must be primarily attributed to knowledge; in other words, logical truth is the principal analogue. But logical truth is not a transcendental, since many judgments are not true.

43. III. **Goodness** is being viewed in reference to some desire; it is that which is desired or may be desired. The goodness of a being is founded in its perfection. Now, a being is *perfect* when it has all the constituents that its nature requires, and all the power needed to act for the attainment of its end; if anything requisite be wanting, the being is imperfect. Its perfection is the reason of its goodness, and both are its very being; for anything is desirable in as far as it can perfect the being that desires it, and it can do so in as far as it has being; thus, every being is good inasmuch as it is a being. Still, perfection is logically distinct from goodness; for perfection regards the being itself, and goodness regards it in relation to the being that desires it.

44. Goodness is of **three kinds**:

1. *Becoming, fit*, or *proper*, *i. e.*, conformable to right rea-

son. This, when taken in a stricter sense, is *moral* good, *i. e.*, conformity to reason as regulating free acts; in a wider sense, it also includes natural or *physical* good, *i. e.*, whatever perfects the nature of a subject, as health, knowledge, etc.

2. *Pleasurable, i. e.*, apt to give pleasure, to give satisfaction to an appetite.
3. *Useful, i. e.*, conducive to the attaining of some other good.

True good is that which meets the principal longing of a being, or which meets a secondary longing without injury to the principal; **apparent good** meets a secondary longing to the injury of the principal longing; thus, sensual delights, when they control a man's reason, are to him not true but only apparent good, since they withdraw him from the pursuit of duty and eternal happiness.

45. **Evil** consists in the privation of some due perfection; hence it is not real being, but the absence in a being of something which is due; no being can therefore be all evil or unmixed evil, for then it would be no being at all.

The privation of some physical good is *physical evil*, that of some moral good is *moral evil*, or sin; the latter supposes a free agent who departs from moral goodness. The absence of further perfection is called by Leibnitz *metaphysical evil;* incorrectly, for it may be no evil at all, since evil is a privation of some good that is due, and the perfection wanting may not be due to the creature. It may be asked what good there can be in physical suffering or pain. Pain can answer the purpose of punishment, of trial, of warning, etc., *e. g.*, if fire did not hurt animals it might destroy parts of their bodies without prompting them to protect themselves. Moral suffering, or grief, is chiefly an incentive to virtuous action, *e. g.*, grief for the sufferings of others prompts us to relieve them.

46. Among the good things that are of the agreeable or delectable kind, the most elevated is beauty. **Beauty** is the perfection of an object viewed as a source of pleasure to whoever beholds it. Since it is an object of desire, it is a kind of goodness; but taken in a stricter sense it is distinct from goodness; good things delight the possessor, beautiful things the beholder. We say the 'beholder,' because beauty is primarily predicated of objects seen or beheld: *quæ visa placent*, says St. Thomas. Still the word is also by analogy applied to the objects of other sense-perceptions, *e. g.*, to sound, and even to the objects of intellectual actions, *e. g.*, to virtue. *Physical beauty* is the perfection of natural objects, *intellectual* beauty is that displayed by the intellect, or exhibited by intellectual objects, *moral* beauty is that of virtue, *artistic* beauty that of art.

47. Since perfection as such cannot be perceived but by the intellect, beauty in its proper sense can be appreciated by none but intellectual beings. And because the perfection of an object implies a certain unity combining all its parts in proper proportion for the attaining of its one end, therefore many consider the very essence of beauty to consist in *proportion* or symmetry, and others in *unity amid variety;* but the essence of the beautiful is more correctly expressed by the terms 'manifest perfection,' 'striking excellence,' *splendor veri*, 'the brightness of truth.'

True perfection is **true beauty**; that false appearance of perfection which cannot stand the test of sound criticism is false beauty. The more perfect an object is, the more beautiful it is in itself, *i. e.*, the more capable it is of delighting the beholder; thus, God is infinitely beautiful; and, if He does not please us above all things, it is only because we know Him so imperfectly.

CHAPTER III.

THE CATEGORIES.

48. We have so far explained what is common to all being; we must next consider various classes of beings. Aristotle has pointed out ten highest classes under which all beings can find a place; these are known as the **categories** or **predicaments** (κατηγορεῖν, to predicate), because all that can be predicated of any being is found to belong to these ten categories. Such predicates are found in the answers to the following ten questions: What is the being? How great? What qualities has it? Whose is it? What does it do? What is done to it? Where is it? In what posture? When? How equipped?

49. When we ask what a thing is, the answer will be, either it is a **substance**, *i. e.*, something existing by or in itself, or it is something added to substance; it must be one or other. Substance is the first category. If a thing is not a substance, it is called an **accident**, *i. e.*, something added to a substance. Here accident is not taken in the same meaning in which it occurs in Logic. The logical accident is distinguished from the genus, species, difference, and attribute; the metaphysical accident now spoken of is a mere negation of that special manner of existence which belongs to substance. Accident does not constitute a genus of which the nine classes of accidents, *i. e.*, the nine remaining categories, would be the species; because the 'being' which is predicated of each accident is not taken univocally;—*e. g.*,

qualities, relations, time, place, etc., are accidents of substance, but so different from one another that they have nothing strictly in common which is not identical with that which is peculiar to each; and the mere negation of substantiality cannot constitute a genus; still, accident may be called a *quasi-genus.*

50. An **accident affects the substance** intrinsically or extrinsically:

1. *Intrinsically*, it may affect the substance absolutely or respectively. (*a*) Absolutely, it may affect the substance by reason of the matter, viz., *quantity;* or it may affect it by reason of the form, viz., *quality.* (*b*) Respectively, it affects one thing as connoting another, viz., *relation.*
2. *Extrinsically*, it may denominate the substance by reason of something else which affects it, viz.: its *action*, *passion*, *place*, *time*, *posture*, and *habiliment.* Each of the categories requires further explanation.

We shall treat: 1. Of substance. 2. Of the intrinsic accidents. 3. Of the extrinsic accidents.

Article I. Substance.

51. By our senses we perceive things in the concrete, substance and accidents united. By our intellectual power of abstraction we, from the first dawn of reason, distinguish the quantity, the qualities, etc., of an object from the object itself, *e. g.*, the size and the color of an apple from the substance of the apple. We conceive the object as existing *in* or *by itself*, but the quantity, etc., as existing *in the object.* Philosophy is only the systematic teaching of common sense. Speaking philosophically, we say that a **substance** (*sub-stans*, standing under) is that which exists in or by itself,

and whatever does not thus exist we call an accident. An **accident,** therefore, is that which cannot exist in or by itself, but exists in some *substratum;* accidents are said to inhere in their subject.

52. When we say that **substances exist in or by themselves** (*per se*), we do not mean that they have no cause, that they exist by their own power (*a se*). This was a leading error of **Spinoza,** who, by making all substances thus self-existing, made them all necessary, and therefore identified all things with God.

53. **Hume** has fallen into another error, by teaching that we perceive nothing but qualities, and that what we call substance is only an unreal bond imagined as holding those qualities together; his theory contradicts the intuitions of all men, and leads directly to skepticism. **Leibnitz** makes substance a force or power; but a power is a quality of some being that has the power. **Locke** does not deny that qualities exist in something else, which he calls a *substratum,* but he adds: "Of this supposed something we have no clear, distinct idea at all" (*Human Underst.,* b. ii. c. 23, § 37). **McCosh,** on the other hand, appears to accept the Scholastic and common-sense doctrine when he says: "Now I give up the idea of an unknown *substratum* behind the qualities. I stand up only for what I know. In consciousness we know self, and in sense-perception we know the external objects as existing things exercising qualities. In this is involved what we reckon the true idea of substance. We can as little know the qualities apart from an object exercising them, as we can an object apart from qualities. We know both in one concrete act, and we have the same evidence of the one as of the other" (*Agnosticism of Hume and Huxley*).

54. Substances are distinguished: 1. Into **simple,** *i. e.,*

such as have no parts, and **compound**, *i. e.*, such as have parts. 2. Into **complete** and **incomplete**. The incomplete is destined by nature to constitute with some other being a substantial unit; thus, the human soul needs the body to constitute man. The complete is not destined to such union, *e. g.*, an angel, a plant; it is therefore the complete principle of all its natural actions.

55. A complete substance is called a **supposit**; a supposit endowed with intellect is a **person**. As a human soul is not a complete substance, it is not a person. The Infinite Being, since it is complete and intelligent, is of course a personal being.

Since accidents exist in their substance, **actions**, which are accidents, belong to their supposit; the supposit it is which acts, *actiones sunt suppositorum;* the parts and powers of the supposit are not so properly said to act as to be the instruments by which the supposit acts. Thus we say 'A man walks,' not 'His feet walk'; 'I am thinking,' rather than 'My mind is thinking'; 'We see with our eyes, feel with our hands,' etc.

56. Since actions properly belong to the person, and the person who assumed human nature in the mystery of the **Redemption** is the Second Person of the Blessed Trinity, all the acts which He performed in His assumed human nature are really the acts of a Divine person, of God; they are Divine, and therefore of infinite merit. In becoming man He took upon Himself a complete individual human nature, *i. e.*, a soul and a body like ours, but not a human personality; He is not a human person, for person is the ultimate *substratum* of an intellectual nature. If, therefore, the ultimate *substratum* or person in Christ were human, then we could not say with truth what all Christians profess who recite the Apostles' Creed, viz., that the "only Son of God was born of the Virgin Mary, suffered, . . . was crucified; died, and was buried,"

etc., nor could St. John have written in his Gospel, "The Word was made flesh and dwelt amongst us."

57. **Personal identity** consists in the permanence of the intellectual supposit, not in the continuity of his consciousness; for even when we are totally unconscious we are still the same individual persons. Mankind has never believed that a man on losing consciousness ceases to be a person or becomes another person. On this point Locke, like many other philosophers, has written much that common sense does not support. He considers person to be merely a 'forensic term,' and personal identity to be nothing but consciousness. "It (person) is a forensic term appropriating actions and their merit. . . . This personality extends itself beyond the present existence to what is past only by consciousness, whereby it becomes concerned and accountable," etc. (*Human Underst.*, b. ii. c. 28, § 27). This doctrine would make us no longer accountable for acts which we have forgotten, of which we are no longer conscious.

Article II. The Intrinsic Accidents.

58. We have defined an **accident** as a being which cannot exist in or by itself, but needs a *substratum* or substance to exist in. By saying that accidents cannot exist by themselves we mean that they cannot do so as nature is now, or according to the actual physical laws. It is not, however, impossible for the Creator to maintain certain accidents in existence without a substance. God can do all that involves no contradiction; therefore He can keep in existence without inhesion in a substance such accidents as only imply a tendency, an exigency to inhere, and do not, in the very concept of them, imply the act of inhering, or actual inhesion in a subject. As a matter of fact, the Church teaches that

after the consecration of the bread and wine at Holy Mass the substances of the bread and wine cease to exist, and still their accidents of quantity, color, taste, etc., are preserved in existence by the supernatural action of the Divine will. In this doctrine there is nothing against reason. For the accidents have being or entity which is really distinct from the entity of the substance, since it may be changed while the substance remains the same. The substance supports that entity, but God can keep it in existence by His will directly without using the substance to produce that effect. For it is clear that whatever effects God can produce through second causes, *i. e.*, through His creatures, He can produce the same directly by His mere will whenever the effect is not of such a nature as to imply a created cause. Now, although the **accidents of bread and wine** naturally inhere in those substances, still human reason cannot see that quantity, color, taste, etc., essentially imply a substance to exist in. A full treatment of this question does not belong to a brief compendium of philosophy.

59. There are two classes of accidents which in their very concept involve inherence in something else, viz.: 1. **Vital acts**, such as those of will and intellect; and 2, **Modal accidents**, *i. e.*, accidents of accidents, *e. g.*, figure, which is a mode of quantity; for every quantity, by the very fact that it has limits, has necessarily some shape or figure, *i. e.*, some mode or manner of limitation. Those accidents which essentially imply only a tendency to inhere are often called **absolute accidents**, to distinguish them from modal accidents and vital acts. But, as explained above, the term 'absolute accident' is also used in contradistinction to the relative accident or relation.

60. The **intrinsic accidents** are three: *quantity*, *quality*, and *relation*.

I. **Quantity,** in its widest sense, is predicated of all that can be more or less. Thus taken, it is predicated:

1. Of *degrees of perfection*, as when we say that a man has a greater quantity of perfection than a plant. 2. Of *degrees of energy* or power, *e. g.*, a man has more intellect than a child. In a stricter sense, taken as one of the categories, quantity means the amount there is of a substance; it implies divisibility into parts of the same species as the whole, as of water into drops, not into gases. It is predicated: 1. Of *multitude*, which is called **discrete quantity,** because its parts are considered as separate from one another (*discretus*, viewed apart). 2. Of the *extension* of material substances, which is called **continuous quantity,** because its parts are considered as not separate (*continere*, to hold together), the end of one part being the beginning of another. The quantity of bodies has three dimensions: length, breadth, and depth; these, considered as existing in given bodies, are called **concrete quantities,** but when separately viewed, *i. e.*, only in their properties, as they are in mathematics, they are **abstract quantities.**

61. II. The term **quality** cannot be strictly defined, since it is a category, containing no genus and difference. It is that which denominates a substance as such or such and not otherwise; not as such a substance, say iron or gold, but such iron or such gold. Quality is often described as "any note that completes or perfects a substance in itself or in its action."

There are **four species** of qualities:

1. Those disposing the subject well or ill in itself or towards something else. Such qualities if transient are called dispositions, *e. g.*, well, ill, ready, unready, etc.; if permanent, they are called habits, *e. g.*, science, health, virtue, vice, etc.
2. Powers, *i. e.*, qualities which enable a subject to do

certain acts, whether such qualities belong to the very nature of the substance, *e. g.*, intellect, will, etc., which belong to every man; or are accidental to it, *e. g.*, talent to learn fast.

3. Sensible qualities, *i. e.*, those which affect the senses, *e. g.*, sweetness, sourness, warmth, cold, white, black, etc.
4. Figure, *i. e.*, qualities regarding the arrangement of material parts, *e. g.*, square, round, straight, etc.

A *passion*, when denoting a passing organic affection, such as anger, hunger, desire, etc., is not called a quality, but it is the accident or category called passion, for it means that a substance is acted upon; when denoting an abiding inclination to any affection, it is a quality of the first kind, *e. g.*, irascibility, gluttony, etc.

62. III. **Relation** is the accident denominating one thing as referred to another which it connotes, *e. g*, parent, greater, double, like, etc.; for there can be no parent unless there be a child, etc. Every relation supposes three things: (*a*) A *subject* which is related. (*b*) A *term* to which it is related. (*c*) A *foundation* of the relation; *e.g.*, when we say "virtue is more precious than gold," virtue is the subject of the relation, 'gold' is the term to which it is related, and 'precious' expresses the foundation of the relation, viz., price or value. A relation is *real*, *logical*, or *mixed:* (*a*) It is **real** when the foundation of the relation is in the things related, independently of our mind, *e. g.*, between cause and effect; if that foundation is found in each term, the relation is called *mutual.* (*b*) It is **logical** when its only foundation is in our mind, as when I say that the essence of God is the reason of His existence; for there is only a mental distinction, and therefore only a mental relation between His existence and His essence. (*c*) It is **mixed** when the relation is real in one of the things

related, and not real but only logical in the other; thus, a contingent being implies relation to the necessary being, but a necessary being can exist without a relation to a contingent being.

The **category of relation** is confined to the real relation; for all the categories express special manners in which things exist. It will be noticed that the mind cannot consider any relation without abstracting the foundation of that relation. Now, brutes have no power of abstracting, therefore they cannot apprehend relations, but only the things related.

Article III. The Extrinsic Accidents.

63. The **extrinsic accidents** are six: *action*, *passion*, *the where*, *the when*, *posture*, and *habiliment*. They are **extrinsic** because in each of them we advert primarily to something distinct from the subject spoken of; *e. g.*, an action is denominated according to its term or effect, as 'to eat,' 'to walk,' 'to read,' etc.

64. I. **Action** signifies that accident which denotes a thing as proceeding from something else; thus, 'to think' denotes thought as proceeding from a thinking principle.

65. II. **Passion** is the receiving of an action. Action and passion are the two terms of the same motion; as when one strikes and the other is struck, one loves and the other is loved, etc.

An action is said to be **immanent** (*in-manere*, to remain in) if its term remains within the same faculty whence it proceeds; thus, 'to feel,' 'to know,' 'to will,' etc., are immanent acts. If the term does not remain within the eliciting faculty, the action is **transient** (*transire*, to pass over); as 'to push,' 'to pull,' 'to cut,' etc. The term 'transient,' *i. e.*, 'passing over,' should not lead us to

imagine that a modification of the subject passes over to the object; but the subject by its action so affects the object as to make a new modification arise in it.

66. III. **The where** is the accident which determines material substances to a place. **A place** is the inner surface of the surrounding body considered as immovable; for bodies may move, but places remain. Thus, the place of a rock is the inner surface of the air or earth that surrounds it on all sides. Hence it is evident that the 'where' is an extrinsic accident. The distance between the surfaces of a body is called its intrinsic place. A body is naturally so related to place that each part of the body occupies a part of the place; this is meant by saying that a body is **circumscribed by the place.** A spirit, having no parts, cannot thus be circumscribed, but is whole and entire in the place and in every part of the place; it is said to be **limited to the place** to which its power is restricted. Spirits are not directly related to place by their own nature, but indirectly and accidentally, inasmuch as their power either is being exerted or may be exerted on certain bodies, and those bodies are in a place. Thus, a spirit is truly in a place; for where it is not, it cannot act; yet place does not belong to spirits in the same sense as to bodies.

67. **Thesis VI.** *Limitless vacant space is not a real being existing independently of our minds.*

Explanation. Space, as far as our observation goes, is not vacant, but filled with matter, at least with ether, *i. e.*, with some imponderable substance, the vibrations of which transmit light even from the most remote points of the universe. Probably there is no perfect void anywhere in the world But, outside of the material world, space is still imagined to extend; we also imagine that, before matter was created, there was a limitless vacant space. Now, we assert that this

vacant space is nothing really existing out of the mind; we merely conceive a possible capacity, the absence of bodily substances.

Proof. If it were a real being existing out of the mind, it would have real quantity, for it has parts outside of parts; its quantity would be finite, or infinite, or indefinite. But it cannot be *finite*, else there would be other space around it; nor *indefinite*, for whatever exists really exists definitely, since indefinite means actually finite but capable of increase; nor *infinite*, for it will be proved hereafter that an infinite quantity actually existing is absurd (No. 93). Hence it is nothing real.

68. **It may be asked:** 1. Cannot space be the immensity of God? We answer, by no means; for space has parts outside of parts, and God's immensity has not; for it is God Himself, who is perfectly simple.

2. What is beyond the universe? Vacant space, *i. e.*, nothing actual.

3. What existed before the creation? Nothing but God.

4. If all substances in a vessel were removed, would there be space in it? Yes, there would be vacant space; vacant inasmuch as it contains no substance, yet real space inasmuch as the sides of the vessel are really related to each other.

5. How, then, is space defined? All space is conceived in reference to extension and relation between extended things. **Real or actual space** is the relation of place between real bodies, *e. g.*, between the sides of a vessel; **possible or imaginary space** is the imagined relation of place between possible bodies; **mathematical space** is extension considered in the abstract; **vacant space** is possible or imaginary space coupled

with the negation of a substance being there. Other authors designate as *physical space* all that we mean by actual and possible space united, and they define it as capacity to contain extended substances.

69. **Objections:** 1. If there were no bodies, space would still have real quantity out of our mind; for it would be really extended, having the dimensions of length, breadth, and depth. *Answer.* It would be only abstract or logical quantity; for it would be imagined as the possible quantity of possible bodies, and thus have only logical entity.

2. If all bodies but one were annihilated, and that one were moving, owing to its inertia it would keep on moving. But it could not move unless real space actually existed. *Answer.* It is enough for motion that there be possible space; real space is a relation between real bodies, and it is clear that this is neither necessary nor actual when there is only one body.

3. But it would really move, and real motion requires real space. *Answer.* We grant it would really move; but motion may be taken in two meanings: (*a*) As extrinsic to the moving body, *i. e.*, as a change of places, and such there could not be, since place supposes a surrounding body. (*b*) As intrinsic to that body, as a mode of its being, opposed to rest, and such motion has nothing to do with the relation which constitutes real space.

70. IV. **The when** is the accident which regards succession in time. To understand succession we must understand duration, *i. e.*, permanence in being. Now, a being can be permanent in three ways: (*a*) If it remains perfectly immutable, its duration is called **eternity.** (*b*) If its

nature is devoid of changes, but its accidents are susceptible of them, as is the case with the Angels, its duration is called **aevum** by the Schoolmen, for which term we have no English equivalent. (*c*) If its very nature is subject to changes, as is the nature of bodies, its duration is said to be in time. Such durations succeeding each other can be counted, and their number or measure constitutes **time.** In this kind of duration alone the 'when' of the categories finds its place.

71. **Time,** therefore, is the measure of succession in changeable beings; it is ever flowing, as the 'now,' or present moment, is ever moving onward, separating the past and the future. The 'now' is the indivisible limit between them. From this explanation of time it is clear:

1. That there was no time before the creation, as there were no changeable beings.
2. That some unit is needed in order to measure time; the apparent motion of the sun around the earth is a unit accepted by all nations.
3. Since time implies a relation between the measure and the measured, brutes cannot apprehend time as such (see No. 62); they apprehend the phenomena only, which happen in time.
4. Since the successions measured are objective realities, time exists outside of the mind; and it is absurd to maintain with Kant that time is merely a subjective concept, by which the mind puts order into the objects of its knowledge.

72. V. **Posture** is the manner in which the parts of a body are disposed with regard to an adjacent body; *e. g.*, when a man is standing on, lying on, leaning against a material object. Posture may remain the same though every part of

the space occupied should change, as when a person travels in a sitting or standing posture.

73. VI. **Habiliment** is the accident by which one bodily substance is furnished with another, as its dress, protection, ornament, etc.

The last two categories, just explained, are of minor importance; but they are needed by the philosopher in order that there may be no manner of being which cannot find its place under one of the highest genera.

CHAPTER IV.

CAUSE AND EFFECT.

74. A **cause** is anything which influences the existence of another thing; the latter is called the **effect.**

A **principle** or **principiant** is that from which a being proceeds or originates in any way. It may proceed from it:

1. *Logically*, as the conclusion does from the premises in reasoning.
2. *Physically*, by deriving physical being from the principiant. It may do so in two ways: (*a*) The principiant may produce it, *e. g.*, a tree producing fruit. (*b*) The principiant may be one of its constituent elements, as a wheel is of a clock.

A principiant is always **prior** to that which proceeds from it, in one of two ways: (*a*) In *time*, by existing sooner. (*b*) By *nature* only, when one being produces or constitutes another without existing before it; thus, flame is a principiant of light, roundness of a circle. These two ways of procession and priority do not embrace the peculiar procession by *origin* only, viz.: when the principiant and what proceeds from it are one identical being. This priority does not exist except in the Blessed Trinity, God the Father being the principiant of God the Son, and these two Persons together the principiant of the Holy Ghost.

75. **It will be readily inferred** from these definitions:

1. That the terms cause and effect always denote two distinct beings, while the term principiant may denote the same being with that which proceeds from it.

2. That procession does not necessarily denote succession in time.
3. That mere succession in time does not constitute procession; thus, the night succeeds the evening, but does not proceed from it.
4. That therefore the terms principiant and beginning are not synonymous; the principiant has an intrinsic and necessary connection with whatever proceeds from it, while the beginning may have only an extrinsic and accidental connection with what follows it.

76. When a cause is viewed as producing the effect, it is taken **formally** as a cause; else it is **materially** a cause. Thus, Columbus was from his boyhood the discoverer of the new world materially, not formally. This distinction between being materially and formally a cause should not be confounded with the other distinction which is next to be explained.

77. There are **five kinds of causes**: the *material* cause, the *formal*, the *final*, the *exemplary*, and the *efficient*.

1. The **material cause** is the matter out of which a thing is made; thus, steel is the material cause of a watch-spring; the distinction between matter and form will be explained further on (No. 127). Speaking analogically, philosophers often apply the name of matter, or material cause, to anything out of which another is produced; thus, they call the faculty of the will the matter, and an act of the will a form.
2. The form, or **formal cause**, is that which specifies the matter, *i. e.*, which makes the matter be of one species rather than another. The form is: (*a*) *Substantial*, if it goes to make the very nature of the substance and cannot be removed without changing that nature; *e. g.*, the vital principle in all plants and animals; for when

it ceases to be or departs, the substance or nature of the plant or animal is no more. (*b*) *Accidental*, if it can be destroyed without affecting the nature of the substance; *e. g.*, the shape of a hat.

3. The **final cause** is the end or purpose intended in an action; *e. g.*, when a man exerts himself to acquire riches, the acquisition of riches is a true cause of his exertion. The object itself aimed at, *i. e.*, riches, is the final cause materially considered; the acquisition of riches is the final cause formally considered.

78. **Thesis VII.** *All action is directed to some end or purpose.*

Proof. Every action is either done with intelligence or not; if done intelligently, the agent has some motive for his action; he is aiming at some result or other; he acts for an end. If an action is not done with intelligence in the agent, then it proceeds from an impulse of nature; it is then the effect of a physical cause. But physical causes act according to the laws by which the Creator governs the universe—*i. e.*, by which a wise God directs all things to proper ends. Therefore all action is directed to some end.

79. **Objections:** 1. A man often acts without a purpose. *Answer.* He then acts upon an impulse of his nature, and all such action is directed to some end by the Author of nature.

2. If he acted upon a natural impulse his action would be good, since it would come from God; but such actions are often evil. *Answer.* As far as his impulses are physical or purely natural they are not evil; but as far as he freely neglects to control his natural impulses according to the law of reason, they are evil.

3. Many actions are merely accidental. *Answer.* Every act proceeds from a cause, necessarily or freely, and therefore no action can be accidental; but an action

may have effects not intended by the agent, and these may be said to be accidental with regard to him, though they, too, have a definite cause, which acts for a definite end.

80. IV. The **exemplary cause** is the model conceived by an intelligent agent to the likeness of which he directs the effect of his work. It may be some pattern extrinsic to the agent which he wishes to imitate; thus, an artist sketches a real scene. Or it may be an original image intrinsic to the agent's mind, such as the plan conceived by a painter of the ideal scene which he wishes to represent.

81. V. The **efficient cause** is the agent that does the action. Every agent acts by its powers or faculties. The power itself is called, in the terminology of the Schoolmen, the *actus primus*, or potential act; the exercise of the power is the *actus secundus*, or elicited act. The potentiality itself is *remote*, or *proximate; e. g.*, an infant, from the very fact that it is a human being, has the power of reasoning, but remotely, *i. e.*, not in a condition fit for use; a grown person has the same power proximately, *i. e.*, fit for use.

82. The requisites for the exercise of a power are called **conditions**; these are not properly causes, since they do not bring about an action, but only remove what might prevent action. For instance, citizenship is usually a condition required for voting, but it does not as such induce one to vote.

A circumstance which is apt to induce an agent to act, though he might also act without it, is called an **occasion**; thus, a time of political excitement is an occasion apt to induce many to vote. If occasions influence actions they are real causes.

83. Several **further distinctions** apply to the efficient cause:

1. If it depends on no other cause, it is called the **first cause**; such is God alone; all others are **second causes**.

2. It is **properly** (*per se*) the cause of the effect intended and of such other effects as are natural consequences of the action done; thus, the surgeon is properly the cause of the pain he inflicts and of the cure he works. It is **accidentally** the cause of effects which were neither intended nor naturally to be expected, as when the surgeon causes death.
3. A **principal** cause is that to which the effect is chiefly attributable; an **instrumental** cause is that used by a principal cause; as when a lancet is used by a surgeon to open a sore with. The instrumental cause is always made to extend, by him who uses it, to some effect beyond its own competency; *e. g.*, the lancet could not cut *skillfully* without the skill of the surgeon.
4. A **free** cause can determine its own actions, a **necessary** cause cannot do so.
5. A **moral** cause is one to which an effect is justly imputed, because it induces another agent to act; it does so by command, advice, threats, provocation, etc., as when a naughty boy provokes a man to anger.

84. Since a cause is that which produces an effect, it is evident that it must in some manner contain the effect; for as the axiom expresses it, *Nemo dat quod non habet*—"No one gives what he has not." Now, **a cause may contain an effect,** or rather the perfection which it communicates to the effect, in three ways:

1. *Formally*, when the cause and effect are of the same species; thus, a plant produces a plant, clouds bring rain, etc.
2. *Eminently*, when the cause is specifically superior to the effect and contains the perfection of the effect in a higher manner of existence; thus, God contains all the perfection of creatures.

3. *Virtually* or *equivalently*, when the cause possesses a superior perfection which can produce the effect; thus, an artist may produce a painting much fairer than himself; he does not possess its beauty eminently, but he possesses an intellect which can conceive and a skillful hand which can express ideal beauty.

When a cause contains an effect formally, it is called a **univocal cause**; else it is an **equivocal** cause.

Since an effect is contained in its cause, it is evident that **no effect can be more perfect than its cause.**

85. We must notice two important **limits to causality:**

1. A finite cause can only modify an existing subject, but not produce a substance from nothing.
2. No cause can **act at a distance**, *i. e.*, where it is in no way present; for where it is not, there it is nothing, and nothing can do nothing. Still it suffices that the cause be mediately present to its effect, as when the sun, by the vibrations of ether, gives light and heat to the earth.

Sceptics have denied the **reality of causes and effects**; but it is evident: (*a*) That all men distinguish the relation of cause and effect from that of mere succession in time. (*b*) That all men judge causes and effects to be realities, on which all legislation, all commercial and professional pursuits, as well as all trades, are based. (*c*) That all languages proclaim this reality, *e. g.*, in the use of such verbs as 'to make,' 'to produce,' 'to push,' 'to pull,' etc., and of such particles as 'why,' 'because,' 'therefore,' etc. (*d*) That we are conscious of exercising effects, *e. g.*, of raising our hands at will, of speaking, walking, etc.

86. The study of principiants and causes obviously suggests two important principles of certain knowledge, viz.: (*a*) **The principle of the sufficient reason,** expressed thus: "There is

nothing without a sufficient reason for it." (*b*) **The principle of causality**, expressed thus: "Nothing is made or begins to exist but by a cause."

87. **Thesis VIII.** *The principle of the sufficient reason and that of causality are absolutely certain.*

Proof. 1. The principle of the sufficient reason is an analytical judgment so obviously evident that we cannot rationally deny or even doubt it without thereby implicitly affirming it; for rationally to deny or doubt it we should see some reason for so doing; and thus we admit the validity of the principle, denying it because we see a reason for so doing.

2. *The principle of causality* flows from the preceding; for when anything begins to exist, there must be a sufficient reason for this beginning. That reason must be either in the object itself that begins to exist or in something else. It cannot be in the object itself; neither in the acts of that object, for it cannot act before it exists; nor in its nature, for then the object would be necessary, but a necessary being is so from eternity and has no beginning. Therefore, the reason of its beginning to exist must be in another being; but this means that it has a cause.

88. **Objection:** All our knowledge comes through our senses; now, causality does not come to us through our senses; we see facts only as succeeding one another, not as causing one another. *Answer.* This objection refutes itself; we know what causality means, yet, it says, this knowledge is not conveyed to us by sensation; therefore, it follows we do not get all our knowledge by sense only. It is, however, correct to say that all our knowledge begins in sensation. The relation of cause and effect is not perceived by sense, but by the intellect on occasion of sense-perception (see Nos. 178, etc.);

e. g., I understand that my sensations are caused by myself as the eliciting subject, and by the bodies perceived as the determining object of my perceptions.

89. **Corollaries.** From all these explanations it is evident: 1. That nothing can be its own cause. 2. That two things cannot cause each other. 3. That the principle of causality is not acquired by induction, but is *a priori*, and only verified by experience. Children show that they have begun to reason when they ask, "Why is this?" (what is the sufficient reason?) "Who made this?" (what is its cause?), etc.

CHAPTER V.

THE CHIEF PERFECTIONS OF BEING.

90. The **chief perfections of being** are *simplicity*, *infinity*, *necessity*, and *immutability*.

I. **Simplicity** is that perfection which makes a being identical with everything that constitutes it; it is a positive perfection, but it is conceived by us in a negative way, viz.: by the exclusion of all composition. A being is *absolutely simple* if it excludes all manner of composition.

91. **Composition** implies a want of identity among the parts of a whole or unit. The whole and its divisions are called **actual**, if there is outside of the mind a true junction or combination of parts. If the parts can exist separately, *e.g.*, 'soul' and 'body,' the actual unit is called **physical**: if they cannot, it is **metaphysical.** Thus man's 'animality' and 'rationality' are metaphysical parts of a metaphysical whole, for they cannot exist separately; take away from a man the principle of his rationality, the soul, and you have left, not an animal, but a dead body. It will be noticed the metaphysical division regards the *comprehension of an idea.* The whole and the division are called **potential** when the parts are not united outside the mind, but are capable of being classed together as realizing the same idea. For instance, 'animal' expresses a potential whole if we consider its extension—*i. e.*, the class of individuals to which it is applicable. This is often called the *whole of extension*, and also a *logical whole*, because the union of the individuals is not in nature but

in the mind only, which apprehends them all by their common nature, and forms of them a mental unit. The latter division is the one which logic properly deals with; for it breaks up larger classes into smaller, and these into smaller again.

92. II. The **Infinite** is the perfection which contains all entity so that none be wanting; it is a most positive perfection, though conceived in a negative way, viz.: by denying all limitation. But, since limitation is itself a negation of further perfection, the absence of limitation in a being, *i. e.*, its infinity, is a negation of a negation, and therefore an affirmation.

The **Potential Infinite** is the finite conceived as capable of constant increase; it is, therefore, not truly infinite but indefinite, though in mathematics it is usually called infinite. The infinite cannot be measured or counted; because measure and number express a limit, and the infinite has no limit. It is also to be observed that no amount of finite additions can ever make the finite become infinite.

93. **Thesis IX.** *No existing quantity can be infinite.*

Proof. Since the essence of quantity implies divisibility, any existing quantity may be divided, at least mentally. Let us, then, cut off a small portion from the quantity which was supposed to be infinite; what remains will be finite; and that finite remainder increased by the small portion cut off will be infinite. But this is absurd, viz., that a finite quantity should differ from the infinite by a small portion. Besides, suppose we add to the finite remainder a portion greater than that cut off; we should then have a quantity greater than infinite, which is impossible. An infinite body would measure an infinite number of yards, and more than an infinite number of feet.

94. **Objections:** 1. The multitude of possibles is infinite;

for there is no limit to the things that God can create. *Answer.* The possibles are not existing; the thesis regards existing quantity.

2. The acts of creatures will go on increasing in multitude for ever. *Answer.* The number of past acts will always be actually finite, though capable of constant increase—*i. e.*, the multitude of future acts is indefinite.
3. It cannot be indefinite; for God knows all future acts of His creatures distinctly, and therefore definitely. *Answer.* God's knowledge is conformable to the reality—*i. e.*, to the object of that knowledge; now, that object is a series of acts, all distinct from one another, ever continuing, but never being an existing infinite series. Besides, distinctness of knowledge is opposed to vagueness of knowledge, and need not imply limitation of the things known.
4. Any extended body contains an infinite multitude of parts. *Answer.* The number of ultimate particles into which a body can physically be divided is finite; but the extension of the body can be mathematically divided without end—*i. e.*, it is potentially, not really, infinite in its divisibility.

95. It may be asked **how we acquire the idea of the infinite.** We do so, not by intuition of the Infinite Being, or God, nor by mentally adding perfections to perfections, for finite things added together can never give the infinite; but seeing finite things we distinguish in them, by abstraction, perfection and limitation; next, by denying limitation we form the abstract concept of unlimited perfection, *i. e.*, of the Infinite Being. The idea thus formed is of a positive object; objectively considered, it is not negative, but most positive; but subjectively considered, it implies affirmation and negation. The idea of the finite, on the other hand, is not a mere

negation; for it is the affirmation of something and no more —*i. e.*, it affirms one thing and denies anything beyond.

96. III. **A necessary being** is one whose non-existence is impossible. It is *hypothetically* necessary, if its non-existence is impossible under a certain hypothesis or supposition; it is *absolutely* necessary, if its non-existence is impossible under any supposition. Now, this cannot be the case unless its very nature implies existence, unless the being be self-existent. If such a being exists it must have always existed, and cannot cease to exist, else its non-existence would not be absolutely impossible; it is therefore eternal—*i. e.*, without beginning and without end.

97. Any being which is not absolutely necessary is said to be **contingent**—*i. e.*, it may be or not be, it is not self-existing. If it exists and yet has not in itself the reason of its existence, it must then have that reason in another being; but to have the reason of one's existence in another is to have a cause; therefore every contingent being, if it exists, must have a cause.

98. IV. **Immutability** is the necessity of remaining the self-same, the impossibility of changing. A **change** is a transition from one state of being to another. It implies three things: (*a*) A former state which is abandoned. (*b*) A latter state which is assumed. (*c*) A subject that abandons the one state and assumes the other.

99. **The change may occur variously**: 1. A substance may be changed from one species to another by losing an old and acquiring a new substantial form, as when metals are oxidized. 2. The subject may acquire or lose some substance without change of its species, as when a sand-bank grows larger or smaller. 3. It may acquire or lose a quality, as when iron gets hot or cold. 4. It may pass from local motion to rest, or from rest to local motion. 5. It may assume a new arrangement of parts, as when water freezes. 6. Supernatu-

rally, one substance may be substituted for another while the accidents remain, as when the bread and wine are changed into the body and blood of Christ. But in this case the word change is taken analogically for *transubstantiation.* A change of relation between one being and another is called an **extrinsic change.** This may occur though one of the two beings remains absolutely immutable, as when God became a Creator without undergoing any intrinsic change, simply because the creatures began to exist, and thus a new relation was established toward God which had not existed before.

BOOK II.

COSMOLOGY.

100. **Cosmology** is the first part of *Special Metaphysics* (No. 4); it is the study of the visible world in connection with its highest causes. We mean by the **world,** or the **universe,** the total collection of all material objects knowable by mankind.

In studying the visible world, we are to consider: 1. Its origin. 2. Its purpose and its perfection. 3. The laws that govern it. 4. The constituent elements of matter. 5. The general properties of bodies.

CHAPTER I.

THE ORIGIN OF THE WORLD.

101. The origin of the world is obviously one of the most important questions discussed in Philosophy. The ancients were divided among **various opinions** on the subject. 1. Plato maintained that the matter which composes the world was necessary, and therefore eternal, but that it was properly arranged by an intelligent Being, who is God. 2. Aristotle supposed that both the matter and the order of the

universe were necessary and independent of any cause. 3. Pythagoras held the theory, revived in the Middle Ages by the eccentric Scotus Erigena, that the world has come forth from the Divine Substance by an outward emanation, an outpouring or outputting of the Divinity. 4. Another explanation, not unknown to the ancients, was scientifically developed in the seventeenth century by the Jewish philosopher Spinoza, who taught that there exists only one substance, necessary, self-existent and infinite, endowed with the two attributes of extension and thought. These attributes he supposed to be necessarily in constant action; the evolutions of its extension producing the various bodies of the world, and the different series of its thoughts being the minds of men; thus, the whole universe would be nothing but a succession of constantly varying phases assumed by the infinite substance. This system has been called an internal emanation of the Infinite Being; it is really Pantheism (*πᾶν Θεός*, everything God), for it makes all things mere modifications of the Divine nature.

102. **Idealism** is a modern system of Philosophy, taught chiefly by Fichte, which, instead of explaining the origin of the material universe, prefers to deny the existence of all bodies, and to maintain that there exists nothing but the *Ego*, whose ever-changing phantasms, like a sick man's dreams, are mistaken for objective realities. This vagary is refuted in Critical Logic, because it denies the reliability of sense-perceptions. The true doctrine, conformable alike to reason and to Revelation, is that "In the beginning God created heaven and earth" (Gen. i. 1).

103. **Pantheism**, if not expressly taught, is at least implied in the speculations of many modern infidels; the Agnostic school inculcates the same error in a milder form, teaching that, for all we know, the visible world may be the

sum total of actual being, the existence of a God distinct from this world being classed among unknowables.

Thesis I. *Pantheism and Agnosticism are systems destructive of all religion, of morality, and of human society.*

Proof. If Pantheism or Agnosticism were true, each of us would be, or at least might be, for all we know, a part of the infinite substance; in fact, the worst men in the world would or might be self-existent, and therefore independent of a Maker and Supreme Master, a part of God, as Divine and necessary as God Himself. If so, no one could or should worship a Superior Being, hence no religion; no one need obey a higher law-giver that would bind his conscience, hence no morality; without morality no restraint on man's selfishness, a mere struggle of might, whence would soon result a state of mere barbarism, the destruction of society.

104. **Thesis II.** *Neither the world nor the matter of which it is composed can possibly be self-existent.*

Proof 1. A self-existent being is immutable; for, if it must necessarily exist, it must also necessarily be such as it is; else why is it such as it is? If it was necessarily a certain thing, no other being could make it anything else. In other words, whatever gives an object existence gives it a definite existence; for it could not give it an indefinite existence. Now, the world and the matter of which it consists are not immutable, but subject to constant changes, as is evident to our senses. Therefore they are not self-existent.

Proof 2. The world and all matter are finite, for all matter is divisible, and as such has quantity; but whatever has quantity cannot be infinite, as was proved in *Ontology* (No. 93). Therefore both matter and a world consisting of matter are finite. Now, a self-existent being cannot be finite, it cannot have limits, for those limits would be self-imposed, but no being can impose limits on its own nature: (*a*) Not

freely, for a being must first exist in a definite nature before it can act freely. (*b*) Not *necessarily*, for this would mean that the perfections of that being exclude all further perfections; but no perfection can be exclusive of any further perfection, since all perfection is positive, and there can be no contradiction except between a negative and a positive. Hence a self-existent being has no limits; it is infinite, and therefore neither the world nor its matter is self-existent.

Proof 3. (*A*) The world is not self-existent, for whatever is such must have existed from eternity, without a beginning, since nothing can begin to exist without a cause (No. 87). But the world cannot have existed without a beginning (see Thesis IV., No. 109). (*B*) Matter is not self-existent.

Who would persuade himself that every particle of dust is a necessary being, having the reason of its existence in its own nature? Every particle of matter bears, as it were, the trade-mark of a manufactured article. The proof may be thus proposed:

If the elements of matter were self-existent, they would constitute a finite or an infinite multitude, but they could do neither. *We prove the major:* (*a*) They would constitute a multitude, for any definite collection of units constitutes a multitude. Now, the elements of matter would be a collection of units, for each of them is a unit. (*b*) This multitude would be finite or infinite, for nothing can exist indefinitely; when, for instance, we speak of an indefinite quantity, we mean a quantity actually finite, but capable of further increase—finite as far as it exists. Hence the elements would constitute a multitude, and that multitude would be finite or infinite.

We prove the minor: The elements of matter cannot constitute a finite nor an infinite multitude: 1. Not an infinite multitude, for no existing quantity can be infinite, as proved

before (No. 93). 2. Nor can it be a finite multitude; for if a million particles, say of gold, existed necessarily, then it would be either by accident or for some sufficient reason that there should be just a million, and not one more or less; but it can be neither: (*a*) Not by accident, for accident means a result without a reason for it, and there is nothing without a reason for it, therefore the number of particles cannot be determined by accident. (*b*) Nor can there be a sufficient reason in the particles why they are just one million in number, since the fact that a million exist cannot be a reason why there could not be one more, for there is no more contradiction in a million and one than in a million particles.

105. **Objections:** 1. Matter is indestructible, therefore it is necessary. *Answer.* It is not indestructible by the power of God.

2. The substance of matter might be immutable, though its accidents are known to be changeable. *Answer.* (*A*) Not only its accidents, but its very substance is changeable, *e.g.*, when a plant dies, when iron rusts, etc. (*B*) If matter being unchangeable, its accidents were changeable, they would have been changing from eternity, since necessary matter would have existed from eternity; and thus there would either (*a*) have been, by this time, an infinite quantity of changes; but an infinite series can never be gone through, and so the most recent change could never have been arrived at; (*b*) or if the number of changes were finite, then the matter must at first have been changeless; and if so, the first change could never have begun, for it was not necessary, and nothing begins by accident, *i. e.*, without a cause, and thus matter motionless from eternity could never have begun to move.

3. Though the elements be singly unnecessary, the whole

collection of them may be necessary. *Answer.* By no means; a collection of unnecessary things is not and cannot be an absolutely necessary collection, for a collection is nothing else than the sum total of the things collected.

4. The world is infinite, for it fills all space, and space is infinite. *Answer.* It does not fill all possible space, but only all actual or real space, and this is finite (No. 68).

106. **Thesis III.** *Matter could not have originated but by creation.*

Explanation. By creation we understand the making of a substance out of nothing. Now, we maintain that, though some species of matter may arise from other species of matter, *e. g.*, water from the chemical combination of oxygen and hydrogen, still ultimately the first matter in existence must have been made out of nothing, *i. e.*, by creation.

Proof. To be created is to be made out of nothing; but matter was made out of nothing; hence it was created. *We prove the minor:* 1. '*It was made*,' *i. e.*, it received its existence from another being, for there is nothing without a sufficient reason. This reason must be either in the being itself or in another being. Now, the sufficient reason of matter is not in matter itself, else matter would be self-existent, and we have just proved that it is not so. Therefore the reason of its existence must be in another being, *i. e.*, it is made. 2. '*Out of nothing*,' for if it were made out of something pre-existing, that something would be mutable, else nothing new could have been made out of it; but what is mutable is not self-existent (No. 103); hence it, too, must have been made, either out of something else or out of nothing. If out of nothing, then our proposition is proved; if out of something else, the same difficulty will always return, until we arrive at

some matter that was not made out of anything else. The only way to evade this argument is to suppose an infinite series of transformations that matter has undergone; but an infinite series could never have been passed through; besides, it would be infinite and still not infinite, but increasing; therefore there was, or is, a first matter made out of nothing.

107. **Objections:** 1. Scientists object that it is unscientific to trace natural effects to a supernatural cause. *Answer.* Scientists do say so, but the only scientific way is to trace effects to their true causes by whatever name you call these. Now, the only true, the only possible cause of matter is creation, as we have proved.

2. But creation is impossible, for out of nothing nothing can be made. *Answer.* It is true that nothingness cannot become a material out of which things are made. But that is not the meaning of creation; it means simply that God, by His Almighty will, without using any material, has made that to exist which would not exist, either in its present state, or in its elements, or in any way whatever, but for the mere fact that He wills it to exist.

3. But the cause must contain the effect, and God did not contain matter. *Answer.* God contained all perfection of matter without its imperfections—*i. e.*, He contains matter *eminently*. For instance, matter is something that can exercise certain powers. God can exercise all those powers—*i. e.*, He can produce all those effects; and thus there is nothing in matter that does not find its prototype in God. He also contains matter *virtually*—*i. e.*, He can produce it, for He is Almighty.

4. The very idea of matter contains extension, but there

is no extension in God. *Answer.* It contains extension in the object of the idea, not in the subjective idea. As to the minor, extension is not formally in God, but eminently—*i. e.*, as far as it implies no imperfections.

108. **A further question** is often discussed with regard to the origin of the world, viz.: Is it certain that its creation could not absolutely have been from eternity, that the world must have had a beginning, that matter itself must have had a beginning? Though it would seem that the very essence of creation implies a transition from non-existence to existence, and therefore a beginning of the creature, still St. Thomas, and many of the most distinguished philosophers, say that a creation from eternity cannot be conclusively proved to be absurd, because it is not so: (*a*) On the part of the Creator, Who was from eternity Almighty. (*b*) Nor on the part of the creature, which was from eternity capable of being created. (*c*) Nor on account of the necessary subordination of creature to Creator, for that, too, would be secured. But though creation, as such, may perhaps be possible without a beginning, there is something special in the nature of the world which shows that it cannot have existed from eternity.

109. **Thesis IV.** *The world cannot have existed from eternity.*

Proof. The world contains a series of changes. If it had existed from eternity, there would have been an infinite series of changes before any particular change could have taken place, *e. g.*, before vegetation began; but an infinite series can never be passed, nor can anything infinite be further extended. Therefore the world cannot have existed from eternity.

110. **Objections:** 1. St. Thomas and many others admit the possibility of creation from eternity. *Answer.* St. Thomas admits that the proofs of this proposition are

not absolutely conclusive; many other great minds think they are conclusive, and they are certainly very powerful, far more so than any objection brought against them. St. Thomas did not wish to rest our belief in creation on a mere reasoning about which logicians might quibble, because it rests on the firmer basis of Divine Revelation. (*Summa*, i. q. 46, art. ii.)

2. The world might have been changeless at first. *Answer.* A material creation absolutely at rest would be useless.

3. The creative act was from eternity, therefore its effect also. *Answer.* It was eternal subjectively, *i. e.*, in God; not objectively, *i. e.*, on the part of the creature.

4. When the cause exists the effect must exist. *Answer.* If the cause acts necessarily, yes; not if it acts freely and by one single act which extends from eternity to eternity (see Nos. 243, 244).

5. But God is a necessary cause. *Answer.* He is a necessary being, but a free cause.

6. The act of creation would have produced a change in God. *Answer.* Yes, if it were not subjectively eternal.

7. From not being a Creator He would have become a Creator. *Answer.* The change was extrinsic to Him and intrinsic to the world, leaving Him as He was.

8. God always does what is best, but to create from eternity is best. *Answer.* God can never do for a creature what is absolutely best, for He could always do better still; the finite cannot exhaust the infinite fund of power and goodness.

9. Motion cannot have had a beginning, for every motion must come from a preceding motion. *Answer.*

Philosophers often call any *act* motion, and it is true that there must have been activity of some kind without a beginning. But the first activity is not in material things; it is in God, Who is all activity from eternity, not by a succession of acts, but He is one infinite act, or, as it is technically called, a pure act, *actus purus.*

111. As to the question **how long the world has really existed,** we are left in considerable darkness. The extrinsic argument of authority is that of the **Mosaic Revelation.** It gives the ages at which the patriarchs begot their oldest sons; whence we calculate that mankind did not exist on earth more than 6,000 years before the birth of Christ. But how long did the material universe exist before the creation of man? The inspired account of Moses, evidently not intended to teach us chronology, is capable of various interpretations, and has been, from remote periods of the Christian era, variously understood by the learned. Some suppose that an unknown period of time, which may have been of any length, elapsed before the first day began; and this appears to be the obvious meaning of the second verse of Genesis. Some interpret the six days as six periods of unknown duration. Others prefer to understand the Mosaic account in the most literal and most restricted sense; these must suppose that the Lord created the earth with many marks of old age upon it. This is indeed possible, but there is no proof of it.

It is the part of Philosophy to trace effects to appropriate causes, and therefore physical effects to physical causes, whenever it can do so without contradicting any certain teaching of Revelation. By *a priori* reasoning we cannot prove either the recent or the remote period of the creation. Reasoning *a posteriori*, Geology, though still most imperfect as a science, makes it appear probable that the earth

had been in existence for a long period of time before the creation of man. [See both the theological and the scientific arguments treated with much learning and logical accuracy in *Geology and Revelation*, by Rev. Gerald Molloy (Part II.); also, Cardinal Mazzella's *De Deo Creante* (Disp. III., art. iv.) and Schanz's *Christian Apology* (vol. i. c. xv.)]

CHAPTER II.

THE END OR PURPOSE AND THE PERFECTION OF THE WORLD.

112. To understand the end or purpose for which anything has been made, we must distinguish between the **purpose of a work** and the **purpose of the workman** who produced the work. For instance, the purpose of a watch is to show the time, the purpose of the watch-maker may be to earn money. We must, therefore, consider two questions with regard to the world: 1. What purpose did God intend in His own creative act? 2. What purpose is the world to accomplish?

113. **What purpose did God intend in His creative act?** He cannot be said to have acted without any purpose; for it is the part of wisdom to act for an end and even for a worthy end. Now, God alone is worthy of Himself: therefore He created for Himself.

Had God, then, anything to gain by creating? He had, of course, to exercise His free will; but He could do this equally well by choosing to create or by choosing not to create. Why did He prefer to create? He had nothing to gain for Himself; for He possessed all perfection. But He could benefit others by creating, and thus exercise His goodness or bounty. It was not necessary for Him to do good to others; yet it was worthy of Him. In this double sense, therefore, God created for Himself, viz.: to exercise His liberty and His bounty. This purpose of God cannot, how-

ever, be called the **final cause** of His action; for a cause produces an effect which is really distinct from itself, while in God there is no real distinction of any kind; His bounty is His will, not the cause of His will; yet it may be called the *reason* or *motive* of His choice. Inasmuch as God wished to exercise His bounty, He created in order to bestow happiness on His creatures; but He intends this end as worthy of Himself, and thus the happiness of the creatures is subordinate to the exercise of His bounty, which is truly God's ultimate purpose.

114. **What is the purpose of the work?** Or what purpose is the world meant to accomplish? Since it was created to exercise God's bounty, the world is certainly intended to make creatures happy, especially the chief creatures, *i. e.*, rational creatures. But this is not its ultimate purpose. For to know the ultimate end for which anything is intended by a wise maker, we have only to consider the highest good which it is capable of accomplishing, and not some inferior good which it may also attain. Thus, a watch may indeed be used as a mere toy or an ornament of dress; but it is fit for something better, viz.: to indicate the time, and this is its primary end. Now, the world is capable of doing more than making creatures happy; it can *glorify the Creator;* and this is, therefore, its ultimate or primary purpose.

115. **Glory** is the recognition of exalted excellence. God recognizes all excellence in Himself, and this recognition constitutes God's *intrinsic glory*. The world manifests to intelligent creatures the goodness, power, wisdom, etc., of the Creator; their recognition of God's perfection constitutes His *extrinsic glory*. It is the highest purpose that this world can answer; it is therefore the primary purpose for which the world exists, the happiness of men being subordinate to

it, as an inferior end must ever be subordinate to a superior end.

While the happiness of men is truly and proximately intended by the Creator, it is fitting that the happiness of intelligent creatures should be made to depend on their own free choice. Therefore men are left free to work out their own happiness; and, as a natural consequence, they are free to fail in that choice by preferring something else; thus moral evil is possible, though not intended by the Creator. But it is not fit that the work of an all-wise God should fail to attain the primary purpose that it was created to accomplish, which is the extrinsic glory of God. Therefore free creatures cannot deprive God of His extrinsic glory. Man can only choose his own manner of glorifying God; either he can reach happiness, and thus *glorify His bounty*, as God invites him to do; or he may spurn this invitation and command of his Master, and, by incurring deserved punishment, *glorify the justice* of the Creator.

116. Hence it is evident that God's will to punish a guilty creature is consequent on the free acts of that creature; it is therefore called God's **consequent will**; but His will to make all men happy is antecedent to their free choice, and is called His **antecedent will.** Hence it is also clear that the doctrine which maintains that God predestines some men to eternal loss is as directly opposed to Philosophy as it is to Revelation.

117. **Thesis V.** *The world is not absolutely but relatively perfect.*

Proof. 1*st Part. Not absolutely perfect.* A thing is absolutely perfect if it attains perfectly the best possible end; but the end which the world attains is not the best possible; for it manifests God's perfections in a finite degree, and its end would be better if it manifested those perfections in a higher degree. Therefore it is not absolutely perfect.

2d Part. Relatively perfect. A thing is relatively perfect if it attains perfectly the exact end for which it is intended; but God must make the world do so; for a wise being makes his works as suitable to their ends as he can, and God, Who is infinitely wise and powerful, must therefore make all His works attain exactly the end for which He intended them.

118. **Objections:** 1. The work of the absolutely perfect Being must be absolutely perfect. *Answer.* No creature can be such that an infinite Creator could not produce a better one.

2. At least an infinitely wise and good God could have produced a much better world than this; therefore this world is not relatively perfect. *Answer.* He could have made one suited to procure a much higher manifestation of His perfections, but not one better suited than this to procure just such an amount of that manifestation as He wishes; relatively to this end the world is perfect.

3. The end of the world is the happiness of men. *Answer.* The happiness of men is their own intrinsic end—*i. e.*, their end as far as their own tendencies are concerned; but it is not their extrinsic end, which is the glory of God.

4. To be relatively perfect the world should manifest the goodness of God; but a world in which most creatures are ultimately unhappy does not manifest His goodness. *Answer.* If this reasoning were correct, it would only follow that most of God's free creatures will ultimately be happy, which we do not deny, because reason and Revelation leave us in ignorance on this matter; for all we know, men may be a small portion of free creatures. Still, it is clear

that the reasoning of the objection is not conclusive, for the minor proposition is not capable of proof.

5. God does not attain the extrinsic glory intended; for many men, instead of honoring, dishonor Him. *Answer.* God will draw good out of evil; the creature will either repent and glorify His mercy, or be punished and glorify His justice for ever. St. Thomas writes: "The defect of doing is made up by suffering, inasmuch as they (the wicked) suffer what the eternal law prescribes for them to the extent to which they fail to do what accords with the eternal law" (1^a, $2æ$, q. 93, art. vi.). And St. Anselm: "God cannot possibly lose His honor; for either the sinner spontaneously pays what he owes, or God exacts it of him against his will. Thus, if a man chooses to fly from under the will of God commanding, he falls under the same will punishing" (*Cur Deus Homo*, Nos. 14, 15).

CHAPTER III.

THE LAWS THAT GOVERN THE WORLD.

119. It is evident *a priori* that a wise Creator cannot produce a world that should be perpetually a mass of wild disorder; and we know *a posteriori* that the world displays the most wonderful unity amid variety, both in the structure and in the operations of its parts. In particular, we observe that all material things have well-defined and constant modes of action, which we call **the physical or natural laws.** The word *law* is here used analogically; it strictly means a rule of action for moral beings.

120. Now, some important questions on this subject present themselves to the philosopher:

1. What is the **nature of those laws?** or whence are those constant and uniform modes of action? There is no effect without a cause; what, then, are the causes of the physical laws? Since all things act according to their natures, the obvious answer is that the natures of things are the causes of their modes of action; and the Author of all nature is the Author of those laws. The physical laws themselves are the uniform modes of action of created natures or essences.

121. 2. Are the modes of action so necessarily constant that **departures from them** are impossible? It is evident that nothing can act except in conformity with its nature, and therefore departures from the physical laws are *physically* impossible, *i. e.*, no created power can produce them; but they are not *absolutely* impossible, for nothing created exists except as

dependent on the power and will of the Creator, and therefore the Author of nature can affect the action of created things, suspending and otherwise controlling it for wise purposes of His own. He may either suspend the action of a physical law, or make a creature for the time being follow other modes of action; for He can change the very natures of created things and therefore all their powers. Or He may let every law continue in action, but neutralize or counteract a force by a stronger force in a different direction. An evident interference of God with the workings of physical agents is called a **miracle.**

122. **Thesis VI.** *The laws of nature are not absolutely immutable, and therefore miracles are possible.*

Proof. That is not absolutely immutable to which God can make exceptions; but God can make exceptions to the laws of nature, for He can do all that involves no contradiction; but that God should make exceptions to the laws of nature involves no contradiction. If it did, the reason of it would be either, (*a*) That the natures of material things are absolutely necessary beings, existing and acting independently of God's will; or, (*b*) That making exceptions to general laws would suppose a change of mind in God with regard to the permanence of His own laws; or, (*c*) That such exceptions would be unworthy of God's wisdom. But these reasons are invalid; because, (*a*) The natures of material things exist and act only in as far as God gives them existence and action; He may, therefore, suspend their action or produce effects that shall neutralize their action, and that shall cause even opposite results. (*b*) When God wills an exception, He wills it from eternity. (*c*) It is wise, on the part of God, to reserve to Himself means of evidently controlling His creation, and thus manifesting His will to man. Now, miracles are such means of Divine manifestations, and are therefore possible to God.

123. **Objections:** 1. Hume and others have learnedly proved

a priori that miracles are impossible. *Answer.* All their arguments are easily refuted; even Huxley acknowledges the possibility of miracles, saying: "No one is entitled to say *a priori* that any given so-called miraculous event is impossible, and no one is entitled to say *a priori* that prayer for some change in the ordinary course of nature cannot possibly avail." ("Science and the Bishops," *Nineteenth Century*, Nov., 1887.)

2. An all-wise Creator should have made the world so that it needed not His interference. *Answer.* The material world does not need God's miraculous interference; but God cannot deprive Himself of the power to interfere with it when He sees fit to do so; for instance, when He manifests His will supernaturally to His intelligent creatures.

3. God could manifest His will by affecting directly the intellects of men. *Answer.* He could do so, and does so frequently; but it is natural to man to obtain his knowledge by sense and reasoning.

4. The physical laws flow from the very natures of things, therefore they cannot be suspended while their causes exist. *Answer.* The physical laws need not cease to exist during the miracle, but a stronger power may prevent their effects; thus, our hands do not cease to be heavy bodies while our will raises them up.

5. Miracles only complicate the economy of nature, and thus destroy the beauty of order. *Answer.* They introduce into the world a higher beauty than that of mere physical regularity.

6. It is an analytical principle that the order of nature is constant. *Answer.* We deny this; unvarying constancy is not contained in the idea of order. It is an analytical

judgment that there must be order in the works of a wise Creator; but order does not, as we have seen, exclude all exceptions. It is the adaptation of means to ends; now, miracles are well suited to the ends for which they are wrought.

7. If there could be miracles, the physical sciences would cease to give certainty. *Answer.* If miracles were of such frequent occurrence that we could not distinguish their effects from natural effects, we grant; else we deny.

8. Miracles are, at least, opposed to physical certainty. *Answer.* Not at all: we have physical certainty regarding what must happen when no miracle interferes, but we have no physical certainty that no miracle ever happens; on the contrary, we have physical certainty of the miraculous facts when we witness them.

9. We have physical certainty that a given miracle did not happen, and only moral certainty that it did happen; now, physical certainty is stronger than moral. *Answer.* We have no physical certainty that a miracle did not happen, but only that a certain effect could not proceed from natural causes; we have moral certainty that the miracle did happen, *e. g.*, that Christ raised Lazarus from the dead: both physical and moral certainty are true in their own lines.

10. Miracles could answer no wise purpose unless they could be known to be miracles; but they cannot be known; for any strange fact may come from some unknown law of nature. *Answer.* An objection that proves too much must be unsound; now, this objection proves too much; for, if it were valid, we could form no scientific induction whatever until we knew all the

natural laws, else what we attribute to one law might be due to another, hidden law. We could then never predict any fact with physical certainty. With regard to miracles, we need not know all the laws of nature to form, *e. g.*, the certain judgment that a dead man cannot return to life by any power of nature.

11. We do not know the full power of the devil; therefore we never know whether God works the wonder. *Answer.* Some facts are evidently the work of the Creator, *e. g.*, the restoration of life to the dead; for this implies supreme dominion over the noblest beings of this world. Besides, the circumstances of the miracle are often such that, if it could be from evil spirits, mankind would be invincibly led into error, and all means would be taken away by which the action of God could be outwardly manifested to the world: thus God would unwisely deprive Himself of what is evidently His sole right. For instance, if the miracles of Christ and His followers as a body could be diabolical deceits, then God Himself would be accountable for the deception of the best portion of mankind.

12. The moral laws are immutable; therefore the physical laws too must be so. *Answer.* There is no parity; it is unholy to violate the moral law; but to oppose the action of a physical law implies nothing that is unworthy of God.

13. The mesmeric fluid is capable of wonderful effects; it may produce many so-called miracles. *Answer.* Effects which may be produced by a mesmeric fluid must not be called miracles; but many things are falsely claimed for a mesmeric fluid—*e. g.*, it is not possible that any material fluid should produce acts of

intelligence, as when the medium is made to speak a language never learned by the person, and to know secrets unknown to all other men; often an invisible intellectual agent is present, distinct from all men concerned. (See Nos. 172–174.)

124. Besides, both with regard to the power of the devil and the strange effects claimed for mesmerism, hypnotism, etc., in many cases it can be clearly found out from the circumstances of the concrete fact in question whether it is the work of God or of the devil, or may be within the power of material nature; and in all cases where this cannot be discovered we must suspend our judgment and not pronounce the fact to be miraculous.

To discern whether a certain effect may proceed from mere physical or material causes, we must observe whether the effect is always the same while the circumstances remain identical. If not, then the causes are not material, since the same physical causes must ever produce the same physical effects in the same physical circumstances.

Since a miracle is a *manifest* interference of God with the working of physical agents, it is evident that we should not call an astonishing event a miracle, unless we know for certain that it is due to God's interference. Now, God may interfere in two ways: either directly, by Himself, or indirectly, through the ministry of His good Angels. When the wonderful event produced implies the action of creative power, it comes from God directly; for no finite being can create, or be the total cause of a new substance. Such acts are said to be **miracles of the first class**; while **miracles of the second class** are those that can be produced by the instrumentality of the good Angels acting as ministers of God. This supposes that the Angels have certain powers over matter. Now, the devils are of the same nature as the good Angels, and they, likewise,

have certain powers over bodily substances, which, however, they cannot exercise independently of God's permission.

125. How shall we know whether, in a given case, the effects produced are not owing to the action of the demon? Evidently, we must have some test or criterion to distinguish true miracles of the second class from mere prodigies of Satan. If we had no test, a miracle of this class could not be known to be from God, and, therefore, could not be an undoubted sign of His will. And, since men cannot readily discern in most cases what wonders require creative power and what others do not, God would deprive Himself of the power of exhibiting His interference to men, if we had no means whatever, no reliable test, whereby true miracles can be discerned from diabolical deceits.

The criterion is this: That everything concerned in the wonderful event be worthy of the holiness and the wisdom of the Creator and His blessed Angels. Hence, we know that an evil spirit is at work if:

1. The preternatural effect is produced in favor of a doctrine or principle which is certainly known to be false, as being either self-contradictory, or against morality, or against a well-established point of Revelation.
2. If the prodigy can answer no purpose worthy of God; for instance, if it were chiefly intended for the gratification of idle curiosity, or for money-making, etc.
3. If the human agent who claims to be the wonder-worker were actuated in such performances by unworthy motives; for instance, by the love of human glory or any inordinate passion.

When the application of this criterion leaves a reasonable doubt as to the genuineness of the miracle, we should not pro-

nounce the effect to be miraculous. For while, before a court of justice, a man is accounted innocent until his guilt be proved, the presumption being in his favor, we claim no such presumption in favor of miracles; on the contrary, we accept none as certain unless it be demonstrated beyond a doubt that the wonderful event cannot be due to any natural agent, nor to the preternatural agencies of the evil spirits.

CHAPTER IV.

THE CONSTITUENT ELEMENTS OF MATTER.

126. We may consider matter as extended substance possessed of different powers according to its different species; or we may consider it as to its further constituent elements of potentiality and activity, whatever be its species. Considered in the former way, matter is divisible into *homogeneous* particles, *i. e.*, into particles of the same nature as the entire mass. Many species of matter can be further dissolved into chemical particles, which are *heterogeneous*, *i. e.*, of different natures; thus, water can be decomposed into oxygen and hydrogen. Oxygen, hydrogen, etc., are not known to be further resolvable into other particles; they are called *simple elements*, not as if their particles had no extension, but to distinguish them from the molecules of chemical compounds.

127. We are now to investigate the **ultimate composition** of bodies, even of molecules of matter, whether they be chemically simple or compound. The following is the explanation given by Plato, Aristotle, St. Thomas, and by the Schoolmen generally; it is called the **system of matter and form.**

Every one of the smallest particles into which a non-living body may be divided possesses, just like the whole mass, certain powers or energies, *e. g.*, affinities, attractions, etc.; for matter without powers would be a useless being, and a wise God creates nothing useless. The source of these powers, the active principle in matter, is called its **form**; by it a substance is constituted such a substance, and different from every other;

it is therefore its substantial form. In living bodies the source of their energies is not in each separate particle, but in the one life principle which determines the species of each plant or animal; of the vital form we shall treat in *Psychology* (Nos. 139, etc.).

Besides the forms, which differ for the different species of bodies, there is something which is the same in all material substances, viz., the principle of extension; it is matter in its first abstract entity, and may be called the *potential principle*, the prime matter, or *materia prima* of the Schoolmen. It cannot exist by itself without some form, for all matter is some kind of matter. This potential principle thus informed by the active principle is, in its ultimate particle which we are now considering, a natural or **physical unit**; it naturally occupies some space which has extension in length, breadth, and thickness. But being a physical unit, though extended, the ultimate particle is not physically divisible into smaller parts. The space, however, which each particle occupies is indefinitely divisible. For instance, when hydrogen and oxygen unite to constitute a molecule of water, their potential principle remains, but their active principles cease to exist as such and are succeeded by a new active principle, that of water.

128. This form of water is said to be **educed out of the potentiality of matter**—*i. e.*, that same prime matter which before was of the nature of oxygen and hydrogen now becomes of the nature of water; before the change it was in **potentiality** to become water, now it is *actually* water; somewhat as a cubic block of wax can become a ball of wax. The change of a square block to a ball of wax is a change of an accidental form, that of one substance into another is a change of the substantial form. The active principles of the simple elements do not, as such, or formally, remain in the compound, yet they may be said not to have perished altogether; they exist still

in the power or virtue of the compound, which can reproduce them, just as the ball of wax can become a square lump again.*

129. If from a mass of non-living matter any physical particle be detached, it remains of the same nature as the mass, and has its own potential and active principle, its matter and form; but in a living mass, an organized body, be it plant or animal, while the potential principle of all the particles remains, all the forms which may have informed the single particles, before being taken into the organism, have ceased to exist as such, and are replaced by the one active principle or form which is the **vital principle** of the plant or animal. It is the form that constitutes any material substance in its species; from the form proceed all its powers of action; the properties which a body derives from the potential principle are extension, divisibility, and, in general, whatever is common to all matter. In a **crystal** there appears to be one principle of action pervading and thus unifying the whole mass, building up the structure on one plan; in this crystals appear to agree with living beings, though, as we shall explain in *Psychology*, they differ from them in many essential respects. (See No. 140.)

130. **Two other systems** of explaining the constituent elements of matter are advocated by other schools of philosophy. The **dynamic theory**, not unknown to the ancients, after being remodeled by Leibnitz, owed its first popularity to the further improvements made in it by Roger Boscowich, S.J., and later by Kant. It teaches that the ultimate elements of matter are *simple unextended particles*, called *monads* (μονάς, unit), all of

* Chemists claim, besides, that some of the properties of the simple substances are preserved in the compounds, in particular their chemical affinities: so that in a molecule or atom of water the affinities of hydrogen and oxygen continue in a manner to exist. They add that spectral analysis shows that the 'spectra' of the simples do not altogether vanish from the 'spectra' of the compounds. (See Pesch, *Institutiones Philosophiæ Naturalis*, No. 132.)

which are homogeneous, and endowed with powers of attraction and repulsion. As each of them occupies only a mathematical point, no number of them could ever make up any bulk, or produce extension, except for their mutual repulsion; and they are kept together by mutual attraction.

131. The **atomic theory** teaches, as its fundamental truth, that the ultimate particles are extended and yet indivisible; they are called *atoms* (ἄτομος, indivisible). This system agrees with the scholastic in affirming that there are ultimate particles of matter which are extended and yet cannot be physically or chemically divided into smaller particles. But it differs from the scholastic theory in denying that the atoms consist of a potential and an active principle, the active principle constituting the specific difference of bodies. It gives no satisfactory reason why the extended atoms are not divisible, since it supposes that they are not constituted as units by a simple form which demands a definite size as well as it demands definite powers. Nor does that theory explain satisfactorily the specific powers of bodies, *e. g.*, of iron and gold. Some writers suppose that the atoms differ specifically, but attempt no explanation; others suppose that the difference consists only in the figure, size, or motion of the atoms.

132. **Thesis VII.** *There are in matter two substantial principles, that of extension and that of specific action.*

Proof. Bodies can undergo substantial changes; but they could not do so if there were not two substantial principles, that of extension and that of specific action; therefore these exist.

We prove the major: Bodies can undergo substantial changes—*e. g.*, water is not a mere mixture of hydrogen and oxygen, but it is a new substance into which the elements are changed. This truth is proclaimed by common sense, by the languages of all nations, and even by the manner of speaking

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of those very philosophers who implicitly deny this fact; few will attempt to deny it explicitly. In fact, all draw a distinction between a mere mixture, *e. g.*, the atmospheric air, and a chemical compound.

We prove the minor: No substantial change of matter is possible unless there be two substantial principles. For in a substantial change something substantial must remain, else there would be a creation of the new substance, not a change from the old; and something substantial must go and come, or be exchanged; for if what is exchanged is only accidental, *e. g.*, figure, arrangement of parts, etc., then the change is accidental and not really substantial. Now, it is noticed that extension always remains, and the specific powers are changed; therefore there are in matter two substantial principles, that of extension and that of specification.

133. It will be noticed, on careful consideration, that neither the **dynamic** nor the **atomic** theory can satisfactorily account for truly substantial changes; for both admit only one substantial principle, which the dynamic calls simple and the atomic extended, but which both theories suppose to be permanent; so that what is changed in the formation of new substances is only the accidents of quantity, figure, motion, etc. If such were the fact, the new bodies would not differ substantially from their elements.

Besides, the **dynamic theory** does not account for extension; for no number of simple monads can fill a space; and the supposition that those monads possess attraction and repulsion does only attribute to one principle two contrary effects, which is anything but scientific. On the other hand, the **atomic theory** does not explain how the atoms can be extended and have certain figures, and yet cannot be separated into parts; nor does it account scientifically for the specific differences.

It belongs to **Chemistry** to study the phenomenal properties of the simple elements, but to Metaphysics to go back of the phenomenal and study the inmost essences of things material and immaterial. In doing so, the metaphysician must take into account all that the phenomenal can teach him. If he is mistaken about the effects, he is apt to misunderstand the nature of the causes. It is, therefore, not a little remarkable that the theory of matter and form, laid down in ages when the physical phenomena were so little understood, should still to-day account more plausibly than any other for all the facts which Chemistry, Biology, and other modern sciences have discovered. And yet such is the case, as is proved by Father Harper in his *Metaphysics of the Schools* (vol. ii. b. v. c. ii. § 4).

CHAPTER V.

THE GENERAL PROPERTIES OF BODIES.

134. The principal **properties common to all bodies** and to no other substances are *extension*, *impenetrability*, *figure*, *local motion*, and *inertia*.

I. **Extension** is continuous quantity, or that property of a body by which it has parts outside of each other and so united by a common bond as to constitute a physical unit. That this property really exists in bodies we know for certain by the testimony of our senses. Still, the essence of bodies does not consist in extension, as Descartes supposed; for space, too, has extension, and yet it is not a body. Extension is natural to bodies, but it is not, therefore, essential to them. True, every body has parts distinct from each other; besides, quantity gives parts a tendency to be outside of one another; next, this tendency is actuated if not divinely impeded. But it may be divinely impeded; and when this happens, as it does with regard to the Body of our Lord in the Holy Eucharist, the parts of the body are not outside of each other; but the sacred Body of Christ is present, after the manner of a spirit, being whole in every part of the species.

135. II. **Impenetrability** is the property by which one body excludes another from the place it occupies. It is natural to bodies, and the tendency thus to exclude other bodies is even essential to bodies; still, its effects can be suspended by the Almighty, as can all action of any created substance. In such a case two or more bodies could occupy the same place, as

when the risen Saviour entered the Upper Room, though the doors were closed. On the other hand, it is not absolutely impossible, because not self-contradictory, that one body should, by **reduplication** of its relations, be in two or more places at the same time.

136. III. **Figure** is an accident of continuous quantity which results directly from its limitations; for whatever is limited must have definite limits; these definite limits to extension constitute figure. The natural figure of a body is determined by its substantial form; for the form gives to the body every determination that belongs to such a species, though its effects in individual beings are influenced by present circumstances. Thus, the forms of metals determine the figures of their crystals; so with plants and animals; still, circumstances may favor or impede the action of the form in each individual case, as when a plant is dwarfed in a cold climate.

137. IV. **Local motion** is the successive transition of a thing from one place to another. It supposes a *subject*, a *term* to which the subject tends, a *force* impelling it to that term. If only one body existed, there would be no such a term, and therefore no motion in the strict meaning of that word, though an impelling force might exist, and cause in that body a mode which might analogically be called motion. Local motion, then, implies a change of place; but **spirits** are not in a place, in the same sense that bodies are in a place, and therefore motion is not predicated of them in the same sense. Spirits, as such, have no necessary relation to matter, and may have been created before matter; but place and local motion are properly accidents of matter only, and therefore cannot affect spirits except indirectly, inasmuch as spirits may be in union with a body, either substantially, as the soul of a living man, or virtually, as when an Angel protects a child. (See St. Thomas, *Summa*, i. q. lx. 4, 1um.) In this latter case he

exhibits his presence in space and acts in space, but is not limited by space.

138. V. **Inertia** does not mean that bodies, as such, have no powers to act, but that they cannot of their own accord begin to act or cease to act, or make any change in their mode of acting. The reason of this impotence lies in the fact that bodies, as such, *i. e.*, as mere material substances not informed by a vital principle, have no perceptions, and therefore no motives to determine their actions in one way rather than another; therefore they can only act uniformly and without spontaneity or power of self-determination. Intelligent and sentient beings, on the contrary, can know a term to which they may tend, and therefore determine themselves to motion or rest, or to one motion rather than another. Intelligent beings may do so freely, because they apprehend the term as unnecessary; but those that are merely sentient, as brutes are, act necessarily upon the stronger attraction; still, their actions, unlike those of non-sentient things, are determined by their instinct, which is a principle intrinsic to themselves.

BOOK III.

PSYCHOLOGY.

139. **Psychology** is the study of living things (*ψυχή*, the vital principle). Now, life consists in the power of immanent action—*i. e.*, in action that affects the agent alone; its effect is self-evolution and self-perfection.

There are **three degrees of life**: vegetative, sensitive, and intellectual life. These rise in dignity above one another as they become more independent of matter:

1. **Vegetative life** needs material organs and assumes into itself material food; still, it is so far above mere matter that it controls the physical and chemical powers of such food, which it converts into its own substance.
2. **Sensitive life** also needs material organs, and perceives only material things; but it assumes into itself the images only of the objects, not the gross matter, in its action of sense-perception.
3. **Intellectual life,** as such, needs no material organs, nor even material images: the soul can understand things entirely immaterial, and material things in an immaterial manner, though, as long as it is substantially one being with the body, it understands its objects in connection with bodily phantasms. We distinguish,

therefore, all living creatures to which our natural knowledge extends into three classes or genera, viz.: **plants**, which have only vegetable life; **animals**, which have vegetable and sensitive life; and **man**, who has vegetable, sensitive, and intellectual life.

We shall consider: 1. The specific nature of plants and animals. 2. Sensitive and rational cognition. 3. Sensitive and rational appetite. 4. The nature of the human soul. 5. The origin and the destiny of the human soul.

CHAPTER I.

THE SPECIFIC NATURE OF PLANTS AND ANIMALS.

140. **Thesis I.** *Living bodies cannot originate from non-living bodies.*

Proof. The effect cannot be superior to the cause; now, there is something in the vital principle superior to all the powers of non-living bodies, no matter how these be combined with one another; viz., it gives living bodies essences superior to the essences of all inorganic bodies. For the essences of things are known by observing their properties and operations; now, all living bodies are observed to have certain properties and operations most of which are superior to those found in any non-living bodies; therefore, all living bodies have natures or essences superior to those of non-living bodies.

The two classes differ:

1. *In structure.* All living bodies, and they alone, are furnished with organs—*i. e.*, with parts of peculiar structure suited to perform vital acts.
2. *In figure.* All living bodies have determined figures proper to each species, and these figures are bounded by curved lines; while non-living bodies have no determined figures, except crystals, and these are bounded by straight lines.
3. *In growth.* Living bodies begin with a cell, from the evolution or multiplication of which the whole organism gradually arises; this development proceeds by

means of nutrition, or intussusception of food, which is transformed into the living substance. Non-living bodies do not arise from a cell; and they increase by juxtaposition of particles from without.

4. *In origin.* Living bodies never come but from germs produced by other living bodies; for the cells cannot be formed by mere chemical combinations, though all the simple elements be present in the proper proportions.
5. *In chemical action.* The vital principle of plants enables them to decompose carbonic acid into its simple elements of carbon and oxygen, absorbing the carbon by their leaves, thus overcoming its strong affinity for oxygen; while animals, inhaling oxygen, which so readily destroys dead matter, use it to support their animal life.
6. *In unity.* All the elements composing any plant or animal obey the vital principle which directs them to procure the preservation of the individual and of the species.
7. *In duration.* Living bodies have a limited period of existence, while non-living ones are independent of time.

Objection. Fungi and maggots are generated by dead matter. *Answer.* They come from living germs floating in the air; the leading scientists are agreed that there is no spontaneous generation, but that, as nature is now, all living plants and animals come from living germs. As to the question whether the Creator could possibly establish spontaneous generation, see No. 158.

141. **Thesis II.** *All plants differ essentially from all animals.*

Proof. The essences of things are known by observing

their properties and operations. Now, all plants are confined to these three functions: nutrition, growth, and reproduction; while all animals exhibit, in addition to these, the power of sensation, and, as a consequence of sensation, an appetite for sensible good, and a shrinking from sensible evil. There is, besides, in all animals an appropriate power of motion, which enables them to move instinctively upon the apprehension of good or evil. Therefore all plants differ essentially from all animals.

142. **Objections:** 1. Of some living things—*e. g.*, of sponges—it is not certainly known whether they are plants or animals; therefore, the difference between them is but slight and cannot be essential. *Answer.* The difference between plants and animals is the power of sensation; though but slightly manifested, it constitutes an essential difference; so that if sponges possess it, as they seem to do, they are animals; if not, they are plants.

2. The sensitive plant has sensation, as its name indicates, and still it is not an animal. *Answer.* It has no sensation; its scientific name is "mimosa," because it mimics sensation; its leaves are mechanically contracted by outside influences, not by its own immanent action.

3. The sunflower turns its face to the sun, the tulip closes its petals at night, etc.; therefore they perceive the sun, the night, etc. *Answer.* The physical action of the sun and of the damp air upon those plants produces these mechanical effects.

4. But many plants grow towards the light, and growth is not mechanical action. *Answer.* The growth comes from the life-principle in the plant, but its effects are modified by favorable influences on the side of the

light, and by unfavorable influences on the opposite side; this argues no power of sensation in the plant.

5. It cannot be proved either *a priori* or *a posteriori* that animals feel and plants do not. *Answer.* (*a*) It is known by the judgment of common sense. (*b*) It is proved scientifically by observing that all animals, even the lowest species which are certainly known to be animals, have organs of sense, while no plants, even the highest, possess these. Besides, animals have motions which cannot be explained except as consequent on the power of sensation, and they give signs, by cries, etc., of pleasure and pain, which no plants ever do.

143. **Thesis III.** *All the vital acts of an animal flow from one vital principle.*

Proof 1. Nutrition, growth, and reproduction in plants are not attributed to three distinct principles, but to one, the vegetative principle; because the effects are subordinated to one another, and thereby show a unity in the cause. *A pari*, since all the functions of life in an animal are subordinate to one another, and co-operate harmoniously to one common end, there must be unity in the cause; *i. e.*, there must be but one principle from which proceed all the vital acts of animals.

Proof 2. If the animal were composed of two vital principles, it would be two beings; for the vegetable would not be the animal, nor the animal the vegetable, but all men judge the animal to be one being endowed with vegetative action, yet not a vegetable.

144. **Thesis IV.** *The vital principle in any living body is truly the form of the body.*

Proof. The form of a body is that principle which makes it be such a body and not a body of another kind, which gives

it such powers and actions and not other powers and actions; in a word, which constitutes the body in its species.

Now, such is the vital principle of any living body. For, 1. If the vital principle ceases to animate the matter, as it does in death, all the specific powers and actions of that body cease. 2. The mere matter, as separate from the vital principle, may become successively the food and the very substance of different plants and animals, its specific nature ever changing with the vital principles that successively inform it. But this supposes that the vital principle constitutes it in its species, or is its form.

145. **Objection.** The substantial form of a body is simple, and therefore indivisible; but the vital principle of some plants is divisible; *e. g.*, a twig may be cut off and continue to live by its own life, the vital principle of the tree being divided. *Answer.* Simplicity has different meanings. We grant that all forms, as such, are simple; they are simple in two senses: 1, Inasmuch as they are not composed of matter and form; 2, inasmuch as they are not aggregates of parts quantitatively distinct, as bodies are. Just in the same senses is the vital principle simple, for it cannot be divided into matter and form, nor into parts quantitatively distinct. As to the curious question whether the principle of life is ever divided, we say that it exists whole and entire in the body and in every part of the body, so, however, that it can neither act, nor even exist, but in an extended body, excepting only the soul of man. To animate a body, the life principle requires a complete organism; therefore, when the organism is destroyed, the vital form ceases to be. Now, in many plants, and in a few of the lower animals, the organism is so simple and uniform throughout in its structure that, when divided, the several parts may still be suited to the functions of life. In such a case the principle of life may continue to animate the several parts; but it

is not properly said to be divided; rather the body is divided; for the vital principle is whole and entire in both parts, which now become two plants. It was before whole and entire in all portions of one body; it is now whole and entire in all portions of two bodies, and in this sense it is rather said to be multiplied than divided; or, better still, it is neither; but the animal or plant is divided. (See upon "Simplicity," *Inst. Phil. Nat.*, by Tilmann Pesch, S.J., No. 211.—Compare St. Thomas's *Summa*, p. 1, q. lxxvi., a. 8.) Thus the twig may become a distinct plant; thus, too, the segments of annulated worms, when severed from the rest of their bodies, become individual worms, this result being accomplished by the division of the matter and the multiplication, if you will, of the form. Other philosophers maintain that the principle of life is really divided in such cases; perhaps it is a mere dispute on words.

146. **Theses V. and VI.** *The brute soul is irrational and therefore ceases to exist when the organism is destroyed.*

Proof 1. It is a judgment of common sense that brutes are irrational or incapable of reasoning, and that their vital principles do not outlive their bodies.

Proof 2. I. **That the brute soul is irrational** is proved scientifically, (*a*) *By induction.* For it is found, by an endless variety of observations, that all the acts of brutes can be accounted for without supposing in them the power of reasoning, of drawing conclusions from premises; in other words, they give no signs of reasoning, and it would be unscientific to ascribe to them a faculty of which they give no indications. This becomes the more evident if we compare their actions with those of rational man. All men, in the full possession of their faculties, can grasp the abstract relation between means and ends, inventing and making new and various means, *e. g.*, tools, to accomplish their designs; brute animals never do so; they

can only follow the one beaten track to which their specific nature determines them. Hence, too, a man can improve himself by study, by exertions of his own talents; brutes cannot do this; they may be taught various actions by man, but they cannot improve *themselves*. Hence, too, a race of men may increase in knowledge and civilization; brutes act now as they were always known to act; and when, by the training of man or the change of physical surroundings, new ways of acting are brought about in some brute animals, it is found by experiment that all brutes of the same species would act in about the same way under those peculiar circumstances. Therefore the effects can be accounted for by reference to phantasms and organic modifications, without attributing to the brute the abstract perception of the relation between means and ends.

That brutes are irrational is proved scientifically, (*b*) *From the nature of reasoning.* Reasoning is absolutely impossible without universal concepts; for in all reasoning the middle term must be at least once distributed or taken universally. Now, brutes never give signs of having universal ideas: all their actions can be accounted for by means of sense-perceptions, phantasms, and instinctive action, which will be explained further on (No. 149).

II. **The brute soul ceases to exist when the organism is destroyed.** For it would be unwise to keep anything in existence which can answer no purpose; but the brute soul, when its organism is destroyed, can answer no purpose; therefore the Creator does not keep it in existence.

The *minor* is clear from the fact that all the functions of the brute soul—*i. e.*, nutrition, growth, reproduction, sensation, and motion—require bodily organs. Besides, it is an obvious principle that the nature of a being is of the same kind as its actions; now, the actions of the brute soul are all bound up

in matter, therefore the brute soul is so too; and, therefore, it cannot exist without matter.

147. Some obvious **corollaries** follow from this: 1. That the brute soul, unlike the soul of man, cannot exist by itself; it is only the substantial form of the brute body. 2. That it needs no creation to bring it into existence; it is educed out of the potentiality of matter, as are the forms of inorganic bodies; with this difference, that the brute soul, unlike those forms, is not educed from matter except by the action of a living agent of the same species.

148. **Objections:** 1. Many actions of brutes manifest design, the intelligent adaptation of means to ends; *e. g.*, when a bird builds its nest. *Answer.* This is true; but the design is not in the animal, but in Him who made the animal such that it must act in that manner—*i. e.*, in the Creator; just as the intelligence that guides the hands of a watch is not in the watch, but in its maker.

2. The watch does not perceive, while the brute does; there is no parity. *Answer.* There are many cases in which the brute acts for a remote end of which it has no more knowledge at the time of its action than the machine has of the purposes of its maker; as when the bird builds a nest for its future offspring, the bee stores up honey in summer for its support in winter. The intelligence thus displayed is certainly not in the brute animal.

3. But the brute displays intelligence in directing means to proximate ends which it presently apprehends, as when it eats to satisfy its hunger and prolong its life. *Answer.* The future prolongation of life is not intended by brutes; they merely apprehend by sense the sensible good of food to satisfy their sensible appetite. The

brute apprehends things in the concrete; there is no abstraction, and therefore no reasoning.

4. If a dog is called by his master, he will run around by a gate or by a staircase, just as a rational man would do; here he displays reason as well as man does. *Answer.* We know from other sources that man has reason. Such actions as the dog performs can all be explained by the sense-perceptions and the phantasms of the brute, together with its appetites and instincts, which we shall explain further on (No. 149).
5. Some brutes can understand language; they must therefore have abstract ideas. *Answer.* They merely associate certain familiar sounds with familiar phantasms. The parrot can even be taught to utter articulate sounds associated with his sensible appetites.
6. Darwin shows that some brute animals have improved themselves; for instance, that the dog has six different barks to express six different feelings. *Answer.* Darwin does not prove that dogs have not always possessed the same accomplishment, but have invented it; if dogs may always have used the same barks, their progress is not proved.
7. Some brutes learn to avoid traps, and one rat, for instance, will avoid them more skillfully than others. *Answer.* The association of phantasms suffices to produce this skill; and one rat may have acquired more of such experience than another. Besides, animals of the same species may have a more or less perfect organism, and, therefore, more skill in animal actions.

149. While brute animals have not the faculty of reason, they have a power or aptitude for the proper guidance of their actions which supplies for them the place of reason; it is called

instinct. It may be defined as the natural impulse that prompts animals to do what is useful to the individual and to the species. It is not something superadded to the animal, but it is the sensitive tendency of its sensitive nature—for instance, its inclination to eat when hungry, to rest when fatigued, etc.

150. Instinct prompts animals, not only to embrace what they sensibly apprehend as present good, and to shun what they apprehend as present evil for themselves; but also to do those **preparatory actions** which are naturally and sensibly connected with the gratification of animal appetites, such as looking for food, retiring to their lair, and even excavating a hole, spinning a web, storing up food, building a nest, etc.

151. In all instinctive actions there is **an adaptation of means to ends,** proximate and remote. The brute animal organically apprehends the nearer sensible ends, and such connection between means and ends as can be represented by phantasms; for instance, it perceives the sensible satisfaction of eating and resting, and the material relations between itself and its food and lair; but it does not apprehend the more remote ends, such as the future prolongation of life, the future propagation of its species, etc. The entire adaptation of means to ends, manifested in the workings of animal instinct, is the work of the Creator, who made the nature, the powers, and the tendencies of animals such as we find them at present.

152. We can the more easily understand the **workings of instinct,** because we experience them in ourselves. In brutes, however, they are far more perfect than in man, for they are intended by the Creator to be the sole guides of their actions. In man they are to be supplemented by the nobler faculty of reason, to which instinct is intended to be subservient. On many occasions we have nothing but instinct to guide us, as

in early infancy and in many animal functions throughout life, such as breathing, swallowing, sleeping, closing our eyelids at the approach of danger, withdrawing our tongue before the closing teeth, etc. In all such adaptations of means to ends we know that reason has usually no part. On many other occasions we are conscious that we are drawn one way by our sensible appetites and another way by our reason; the latter ought then to be obeyed.

153. **Thesis VII.** *Plants and brute animals are intended for the use of man.*

Proof 1. The purpose for which an object is intended, especially when it is of a complicated and delicately adapted structure, can be known by examining its fitness to accomplish a certain end or purpose; else we should have to grant that the striking adaptation of means to ends is an effect without a proportionate cause. Now, plants and animals are most delicate contrivances of intricate structure, and they are admirably adapted to the use of man. Therefore they are made for it.

Proof 2. All things are created for the extrinsic glory of God (Nos. 113 to 115); now, irrational things cannot by themselves glorify God, but only through man, being in some way of use to man; hence they are intended for the use of man.

154. **Irrational creatures may be of use to man,** and thus glorify God through man, in various ways: 1. By displaying to the eyes of man the power, wisdom, goodness of their Maker, and thus prompting man to love and praise God. 2. By supplying the bodily wants of man, and thus aiding him to serve God. 3. By administering aids to his rational pleasures, thus inducing him to love his God, and to serve him cheerfully. 4. Even things which molest man, such as the inclemencies of the seasons, beasts of prey, troublesome insects, etc.,

render service to man, making him more industrious, cleanly, provident, etc., and enabling him to bear the ills of life in the spirit of dutiful submission to the sovereign will of God.

155. **Objections:** 1. Many creatures are absolutely useless or even injurious to man. *Answer.* There are creatures of which we do not know the use; but it does not follow that they are of no use. From the fact that the vast majority of creatures are known to be very useful, we should rather conclude by induction that the others also answer a useful purpose.

2. Some plants and animals are known to be injurious. *Answer.* They may be injurious in some respects, and yet be very beneficial in other respects; thus, poisons become medicines in the hands of science.

156. **Thesis VIII.** *The species of plants and animals are fixed—i. e., incapable of transformation.*

Explanation. By a **species** we mean a class of plants or animals which have characteristic properties in common and can be indefinitely propagated without changing those characteristics. A species may indeed produce a **variety**—*i. e.*, one or more individual plants or animals marked by some striking peculiarity not common to the species generally. A **race** is a variety perpetuated through several generations. Thus, in the canine species, we have many races that differ considerably from one another; still, all have certain characteristics in common, which mark them as belonging to the canine species. By saying that the species of plants and animals are fixed, we do not mean that no new races may arise and be propagated; but we here assert that the changes will never result in the evolution of new species. The **crucial test,** by which the distinction of species is known, is this: if animals can be paired together and thus propagate an indefinitely fertile offspring, they are of the same species; else they are not. Thus

horses and asses are known to be different species, because, although they can by crossing generate the mule, still this hybrid is incapable of continued propagation. It is also important to notice that those scientists who maintain the evolution or transformation of species as a theory pretend that the new organisms evolved are usually more perfect than the antecedent species.

Proof 1. There can be no effect without a proportionate cause; but if higher species were evolved from lower, the improved new species would be without a proportionate cause. For inasmuch as the new species is more perfect than the old, it has no cause in the old. The new offspring of plants and animals may, at the most, have some accidental superiority over the parent stock, being born and raised under more favorable circumstances, but accidental changes constitute no specific difference.

Proof 2. By induction. Though scientists have now been at work for many years in exploring lands and seas, in examining the fossil remains of countless species of plants and animals, and in applying all the inventive genius of man to obtain and perpetuate new varieties and races, they have never yet been able to exhibit a single decisive proof that a transformation of species has ever taken place. Animals are now as they are represented on the pyramids or found mummified in the tombs of Egypt, as they were before they left their fossil forms in the rocks. Many species have become extinct, others are found now of which no very ancient specimens have been discovered; but it cannot be proved that any species was ever evolved from any other.

Proof 3. That the test of indefinitely continued fertility in the species is the crucial test by which the theory of evolution must be judged, and that the theory cannot stand this test, is acknowledged by its ablest advocates. "Without verifica-

tion," says Tyndall, "a theoretic conception is a mere figment of the intellect" (*Fragments of Science*, p. 469). "Our acceptance of the Darwinian hypothesis," says Huxley, "must be provisional as long as one link in the chain of evidence is wanting; and as long as all the animals and plants certainly produced by selective breeding from a common stock are fertile, and their progeny are fertile with one another, one link will be wanting" (*Man's Place in Nature*, p. 107). Therefore, the theory which contradicts our thesis is a mere figment of the intellect. (See No. 209.)

157. **Objections:** 1. Paleontology shows that the fossils found in the higher strata of the earth belong to more perfect species of plants and animals than those in the lower strata; there must have been an evolution of less perfect into more perfect species. *Answer.* The fact stated is not found to be true in all cases; but even if true, it would only show that there is order in the works of the Creator, not that the higher species are evolved from the lower. *Post hoc, ergo propter hoc*, is a sophism.

2. Anatomy proves that all the forms of life are constructed according to a uniform type or plan, so as to constitute a regular system. *Answer.* This, too, shows that there is symmetry in the works of God, but not that there is evolution of species in nature; you might as well say that all Gothic buildings are evolved from one another.

3. Anatomy also reveals the fact that the more perfect animals retain certain rudimentary organs which are of no present use, and which are mere remnants of a former useful structure; therefore evolution has taken place. *Answer.* Anatomy does not prove that the so-called rudimentary structures are of no use to those higher animals; they serve, at least, for ornament, and

give symmetry to the creation. Darwin classes our sense of smell and our external ear among these useless remnants, while it is certain that they are very useful; such pleadings exhibit much weakness in the theory.

4. Geography shows that certain species of plants and animals are peculiar to certain climates; therefore the influence of the climate must have produced them. *Answer.* The wisdom of God has provided for each climate its appropriate fauna and flora, usually by the natural process of variety of races, never by the evolution of new species.

5. Physiology has discovered that the embryo of a higher animal species passes through the forms of all the lower species in its process of evolution. *Answer.* The development of an individual animal is one thing, and that of species from species is quite another; the one fact does not prove the other. Besides, the statement itself is inexact, and the order of embryonic evolutions is different in different species.

6. A worm becomes a butterfly; therefore a less perfect animal may be developed into one more perfect. *Answer.* Only those worms become butterflies which come from the eggs of butterflies; the species remains unchanged.

7. Even the Schoolmen admitted the possibility of spontaneous generation—*i.e.*, of the generation of an animal from brute matter only, without a living germ. *Answer.* They admitted it as possible in connection with a higher influence proceeding from a heavenly body, but not as resulting from the combination of merely material elements; this higher influence might, in their opinion, replace the living germ, thus showing that they felt convinced that life cannot proceed from lower elements

only, no matter how combined. (Pesch, *Inst. Phil. Nat.*, No. 190.)

158. It may be asked whether the Creator could have established a series of **evolutions from less perfect to more perfect species.**

Reason answers that God can do all that is not self-contradictory. Now, such a series, taken in one sense, would be self-contradictory, but not in another sense. It is absurd that a superior effect should proceed entirely from an inferior cause, but not that God should supply by His own action whatever perfection is added to the effect—*i. e.*, to the new generation. Nor is it evidently impossible that the Creator should direct the evolution of a lower into a higher species by the agency of second causes, wisely combined for that purpose. But it is metaphysically impossible that a merely fortuitous combination of causes, without a wise designer to direct the work, should build up a most wonderful system of development, running through the whole vegetable and animal kingdoms, such as scientists claim that evolution has accomplished. To say that merely blind forces produce so much beauty and harmony, is fully as absurd as to pretend that a man can compose a grand and harmonious poem without knowing a word of the language in which it is written. A system that ascribes effects to totally inadequate causes is unscientific.

CHAPTER II.

SENSITIVE AND RATIONAL COGNITION.

159. In our treatise on Critical Logic we have devoted a whole chapter (Ch. III.) to the explanation of the means by which certainty is obtained, entering into considerable detail on the subject of sensitive and on that of rational cognition. We have now to examine **the nature and the workings of those two faculties** in themselves; and we, therefore, add in this place such further details as were omitted before because they did not affect the certainty of human knowledge.

ARTICLE I. OF SENSITIVE COGNITION.

160. Speaking in *Critical Logic* (*Logic*, No. 142) of the outward senses, we remarked: "Two very different questions present themselves on this subject: 1. How far is the testimony of our external senses reliable? 2 How do the senses work so as to give us reliable testimony?" We then examined the first question; we are now to present the **Scholastic theory**, which answers the second query.

161. **How, then, is sense-perception effected,** whether it be considered in man or in the irrational animal? All animals have at least the sense of touch; perfect animals have the same five outer senses as man: the sight, hearing, taste, smell, and touch; they have also the inner senses, viz.: the common sense, imagination, sensile memory, and power of appreciation (*Logic*, No. 102). These are not mere instruments of

a most delicate structure, but they are living organs in which and by which the animal exercises its faculties. The purpose for which they are intended by the all-wise Creator is to enable the animal in different ways to acquire cognition of the material objects with which it comes into immediate or mediate contact. Now, cognition implies that an object impresses some likeness of itself upon the cognitive subject, and that the subject, reacting, expresses the object thus impressed, apprehending it vitally. Thus the cognitive subject perceives, not indeed a likeness of the object but, by means of the likeness, the object itself. This process is observed both in all sensitive and in our intellectual cognition.

162. Confining our attention, for the present, to sense-cognition, we notice two distinct steps in the act of perception. 1. The object perceived must act upon the subject perceiving, by impressing on it—whether directly, as in touch, or through a medium, as in vision—some likeness, image, or species of itself. This image is called by the Schoolmen the **species impressed,** *species impressa.* Hence it is clear that sense-cognition begins with the action of the object; and, as the object cannot give forth an image of what it is not, but only of what it is, therefore it tends essentially to beget true cognition in the subject.

2. The subject perceiving must not be merely passive; for then it could not be said to elicit the act of perception or sensation; it must, therefore, react vitally on the impression received. And since all cognition is an immanent act, the sentient subject must reproduce in itself a vital image of the object. This vital image is styled the **species expressed,** *species expressa;* and the subject's immanent act of forming this vital image is its apprehension or cognition of the object.

163. The species impressed and expressed in sense-perception are, of course, **the images of material objects existing in the concrete.** Those objects are directly perceived by sense;

the species are no more noticed by the sentient subject than the picture formed on the retina of the eye is noticed by us in our acts of vision.

164. If it be asked **where the sensation takes place**, in the sense-organ, say the eye, or in the brain, we answer that both brain and eye and connecting nerves co-operate in the act of seeing; all these together constitute the complex organ of sight; but the act of seeing should be said to be accomplished in the eye, the act of hearing in the ear, etc.; for thus only can it be properly said that we see and hear the outward object, and not the image of the object, or a modification of our senses.

165. The **imagination**, on the contrary, does not act in the organ of the outer senses; but its organ is the brain. It exists in perfect animals, and may perhaps be wanting in lower species of sentient life, some of which appear to have no senses but those of touch and taste. The imagination is the faculty by which animals form to themselves organic images, called phantasms, either of sensible objects perceived, or, in man at least, of other objects never perceived. In the latter case the images result from the combination of former phantasms, which themselves have been ultimately derived from objects of sensation.

166. The **sensile memory** performs a threefold office: (*a*) It directly brings back former phantasms; (*b*) Indirectly—*i. e.*, through the phantasms reproduced—it represents objects formerly perceived; (*c*) It represents them as having been formerly perceived.

167. There is one sensible power of cognition to which it was not necessary to advert in Critical Logic since it is not one of the means by which men acquire certainty; we mean the **power of appreciation**, the *vis æstimativa*, of the Schoolmen. It is the highest of merely organic faculties, because

it approaches the nearest to the intellectual power of judgment. Its action consists in apprehending certain concrete relations which sensible objects bear to the sentient animal. By it the lamb, even the first time that it sees a wolf, apprehends him as dangerous to itself; by it the bird apprehends a straw as just then suitable for its nest. Such apprehensions are often called *sensible judgments*. They differ from intellectual judgments: (*a*) In always dealing with concrete material things; (*b*) In apprehending by mere organic action the relations existing between such things and the animal subject; (*c*) In absolutely excluding all abstraction.

168. In connection with the imagination, referred to above, it is appropriate to give here a brief explanation both of *dreams*, which are chiefly the work of the imagination, and of *sleep*, which occasions dreams. **Sleep** is a natural interruption of the equilibrium between the various faculties of man; for we shall confine our remarks to the sleep of man. It arises from the exhaustion of the animal organism, and is ordained by nature to restore that organism to its former freshness. It differs from disease, which is an unnatural disturbance of the same equilibrium.

169. We should not, then, imagine that sleep is a cessation of vital action, but rather it is **a special mode of vitality.** In sleep, 1. All the vegetative powers continue to act, but more gently and with more uniform motion than before. 2. The action of the senses is more or less suspended. 3. The sensible appetites are much relaxed. 4. The intellect may act, but it is not fully conscious of its operations. 5. The will may act, but not freely; hence we are not accountable for its actions when we are fully asleep, and not fully accountable when we are half-asleep. Sleep is really a time of repairs to the body; during it the machinery of the organism is out of gear.

170. **Dreams** are series of phantasms, reproduced and combined anew by the fancy, accompanied at times by some intellectual activity, while the nerves of the body are relaxed in sleep. Dreams are often started by actual impressions on the slumbering senses—for instance, by some sounds or feelings—and they are greatly influenced by any abnormal condition of the nerves and the blood. Our phantasms are not isolated, but variously associated with each other by similarity, by congeniality, by having been formed contemporaneously, etc.; and thus, when one phantasm is aroused, others are thereby excited, whether we are awake or asleep. When awake, we can to a great extent regulate the workings of our imagination by our will, and we are inclined to do so in connection with our sense-perceptions; but when we are asleep, our fancy has full play, and may, for all we know, be constantly moving, though it may leave no traces of its vagaries. From the nature of dreams just explained it is evident how foolish it is to attach any signification to them as foretelling future events, unless on special occasions they should be preternaturally produced by Providence for worthy and important purposes.

171. **Somnambulism** is a dream giving rise to corresponding external actions. Somnambulists act outwardly in conformity with their imaginations, but in a strange manner. 1. They proceed as if they saw, while their eyes are closed or rigid; thus they will avoid obstacles in their way, yet they really do not see, but are guided by their mere imagining of the familiar places, and therefore they will strike against obstacles to which they are not accustomed. 2. They do bolder and sometimes more ingenious things than when awake; for they do not reflect on danger, and all their faculties are concentrated on one purpose. 3. On awaking, they have no recollection of their wanderings.

172. Phenomena similar to those of somnambulism are produced by the **mesmeric sleep.** Mesmer (A. D. 1733–1815) boasted of having invented an art of healing diseases by means of magnetism, which he excited by touching the sick with a firm will to restore their health. One of the means employed in that process is the artificial or magnetic sleep. Seeing that sleep is merely a natural disturbance of the vital powers, we find nothing astonishing in the production of an artificial sleep by natural means. Nor is it absurd to suppose that the mesmerizer may affect the slumbering faculties of the sleeper or medium, usually a nervous woman, and so influence her imagination as to direct, to some extent, her feelings and her outward motions. But the magnetizer cannot do this directly by his will or his intellect; these faculties are essentially incapable of acting outside of the soul, and the soul is not outside its living body.

173. Induction proves that the souls of men cannot, in our present condition, communicate or act upon each other except by means of the body, and therefore by means of matter. As long, therefore, as the effects claimed to be produced upon the medium can be the results of material influence, those effects may be natural; but many phenomena of mesmerism are beyond the reach of material causes, and therefore they are **preternatural.** For instance, it is claimed that the person magnetized may become possessed of new intellectual powers, such as mind-reading and the power of seeing what is beyond the reach of the senses; or the medium suddenly possesses knowledge of things never learned, as of the latent causes and the remedies of diseases, or exhibits familiarity with foreign languages, etc. It is the part of Philosophy to trace effects to adequate causes. Now, some of the effects attributed to mesmerism, when they are really such as they pretend to be and not mere jugglery, cannot have any adequate causes in

man, but only in spirits distinct from the souls of all those visibly present on such occasions.

174. The same test will apply to the phenomena of **spiritism**; namely, all clear exhibition of knowledge or intellectual action must be ascribed to an intellect as its source. If this cannot be the intellect of living men, then the effects must be ascribed, both in spiritism and mesmerism, to the agency of the evil spirits. For neither God, nor His good Angels, nor the souls in bliss could be supposed to put themselves at the disposal of spiritists or mesmerists, especially if we consider the unworthy and often immoral means employed by such men in their trades. Nor can a man claim control over the souls of the condemned; and, even if he could, it would be unholy and unwise for any one to make these his advisers and helpers. But it is perfectly conformable to the teachings both of reason and of Revelation to conclude that the evil spirits, or demons, are the agents of all such effects in spiritism and mesmerism as cannot be attributed to human power. Spiritism is explicitly forbidden in Holy Writ: "Neither let there be found any one among you that seeketh the truth from the dead. For the Lord abhorreth all such things." (Deut. XVIII. 12. See further Jouin's *Evidences of Religion*, pp. 74, etc.)

Article II. Rational Cognition.

175. From the explanation given in the preceding article it is clear that sense-perception consists in the formation, by the sentient being, of vital images representing the material objects perceived. Now, a similar process must be followed by rational or intellectual cognition: it too consists in producing an image of the object known; not, however, an organic, a material, but an intellectual image. For truth in the mind, logical truth, supposes that the mind is made conformable

to the object known; and it can acquire this conformity in no other way than by conceiving an image of that object. This point, then, is **common to sensitive and to rational cognition,** that both are accomplished by the formation, in the subject, of vital images representing the objects. Another point must be common, viz., both must derive the image from the object which it represents; else the cognition would not be certainly true, or conformable to the object known.

176. **But a difference between sensitive and intellectual knowledge** arises from the fact that, in sensitive knowledge, a material object impresses a material image of itself upon the material organ of sense; but it cannot impress a material image upon the immaterial intellect. The intellect cannot receive such an image into itself. It takes, **abstracts** from the material objects presented, or rather from the sensible phantasms of them, the intelligible notes of the objects; these are the immaterial images, impressed on the intellect as the *species impressed;* and re-acting, eliciting the vital act of cognition, the intellect forms the *species expressed*, thus completing the act of intellectual apprehension. The result or term of this process is an *idea:* here, then, we have the Scholastic theory which accounts for the **origin of ideas.**

177. The Schoolmen, always careful to give names to every step discernible in the analysis of any process, gave the name of **intellect in action,** *intellectus agens*, to the intellect when viewed as abstracting from the phantasms and producing the immaterial image, and the name of **receptive intellect,** *intellectus possibilis*, to the same faculty viewed as vitally receiving that image.

178. It may be asked whether all our ideas are obtained by a like process; and if so, how can we have ideas of things immaterial? Many philosophers have supposed that we have some **innate ideas,** ideas born in us, such as those of

truth, virtue, vice, etc. Others have gone so far as to maintain that all our ideas are inborn, and only awakened, not acquired, under favorable circumstances. These are idle suppositions, devoid of all proof and, moreover, liable to the serious objection that, if our ideas are not derived from the objective reality, they may be merely subjective, and our knowledge may be an illusion. But our ideas are truly derived by way of likeness from the objects themselves; and therefore our knowledge is objective and reliable.

179. Another false theory is that of the **Traditionalists**, who pretend that all our knowledge comes to us by tradition, —*i. e.*, by the teaching of other men. This is a most unsatisfactory theory: other men can only use signs corresponding to our ideas, but not put ideas into our minds. If they give us a sign to which none of our ideas corresponds, the sign is unintelligible to us: thus, no amount of explanation can make a man born blind understand the nature of color, or the formal difference between one color and another. There remains a last false theory, that of the **Ontologists**, which we shall later on refute with more detail. (See Nos. 187, 188.)

180. We must first consider how we get ideas of things immaterial, inaccessible to the senses. We have no intuitions of such objects—for instance, of virtue, vice, justice, truth, etc., nor of spirits, of God, of our own soul, etc. How do we get our ideas of all such things? The Schoolmen, in accord as usual with the ancient Peripatetics, or followers of Aristotle, clearly lay it down as a maxim that **there are no ideas in our intellect which we have not derived from sense-perception,** *nihil est in intellectu quod prius non fuerat in sensu.* This principle is true, but it needs explanation.

181. At first sight the saying appears absurd: we have an **idea of spirit,** but we have never beheld a spirit; how, then, can we be said to have derived this idea from sense-perception?

Let us consider what we mean by a spirit: we mean an immaterial substance capable of thinking and willing. Now, by our senses we perceive material substances. By our power of abstraction we look at substance only; we strip substance of all that is material in or about it. In conceiving a spirit, we affirm substance and deny matter: our idea of an immaterial substance is partly affirmative and partly negative; but all its elements are derived by abstraction from sense-perception. But how do we get the ideas of 'thought' and 'will'? We perceive acts of thought and will in ourselves by our consciousness. But how is consciousness connected with sense? We could not be conscious of our mental acts, if these acts did not exist; and they would not exist, if sense-perception did not prompt our minds to act. For no thought, and of course no volition, would arise in the human soul, if sensation did not call forth the exercise of our faculties. Thus we see that all the elements contained in our idea of spirit are traceable to sense-perception; the same holds for all our other ideas. In fact, if we were to examine all the ideas expressed in so intellectual a poem as Milton's "Paradise Lost," we should find in it no concept the elements of which have not ultimately arisen from sensation. Many of those concepts are not conformable to an objective reality, because they are not directly formed from objects represented by them; but inasmuch as their elements are derived from real objects, all ideas have a foundation in the reality. Such are, for instance, the concepts of Death and Sin, as Milton describes those creations of his poetic mind.

182. We are now prepared to give a connected and, as it were, **an historical account of the origin of our ideas** according to the system of those Schoolmen who follow St. Thomas most closely. We start with the maxim, explained above, that all natural knowledge originates in sense-perception. The

mind of the child is at first like a clean tablet, *tabula rasa*, on which nothing as yet has been written : it has no inborn ideas. Its avenues to knowledge are its senses. If these should be so clogged by disease as to be unfit for action, the intellectual powers will never be set to work ; in fact, we find that persons born deaf and blind are apt to remain idiotic. When the senses of any child first open to the outward world, it begins to have sense-perceptions, as brute animals have ; there is for a considerable time no sign of intellectual action. When the brain, the organ of the imagination, becomes sufficiently perfected to elaborate phantasms suitable for intellectual use, the intellect becomes aroused to its specific activity. It sets to work abstracting what is intelligible in the object, and forming an image of the object's nature. It impresses this abstract species upon the receptive intellect, which in turn seizes upon or expresses the image in itself, and thus intellectually apprehends or cognizes the object. For instance, the hand seizes an orange, the eye sees it, the palate tastes it, etc. ; the phantasms formed by the imagination represent all that is sensible in the fruit. The intellect goes deeper; it reads within the reality, as its Latin name signifies (*intus legere*, to read within) ; it abstracts and conceives the ideas of 'being,' 'substance,' 'accidents,' in particular of 'size,' 'taste,' 'smell,' 'color,' of 'cause,' 'effect,' 'food,' 'pleasure,' etc., etc. All the senses, interior and exterior, are constantly bringing new phantasms to the brain ; the intellect is constantly abstracting and comparing, conceiving and judging; inductive reasoning, now fairly aroused, contributes its share to develop knowledge ; and thus all our ideas are gradually formed, having a foundation in objects of sense-perception.

183. At first these ideas are not considered by us as representing whole classes of things : the ideas are **direct**, representing the notes 'being,' 'substance,' 'cause,' etc., which

exist identically in each individual object considered; but we do not yet reflect on the fact that the objects are generically or specifically identical. For instance, when I see a rock, a fruit, a man, etc., I apprehend each as a substance; this apprehension gives me the **direct universal** concept 'substance.' By observation I notice the identity of the objects; but it may be a long time before I reflect sufficiently upon my direct universal concepts to perceive distinctly that they are universal—*i. e.*, that they represent one thing common to a whole class of things. When I do so at last, I have a **reflex universal** idea.

184. Philosophers have warmly discussed the nature of reflex universals. The question is a radical one; errors on this subject strike at the root of all our knowledge. The **Nominalists**, such as Bain and J. S. Mill, maintain that universals are mere names assigned to a whole class of things, because we choose to fix our attention on some attributes which resemble each other in different objects; they do not suppose that anything is common to such objects, but only that we give the same name to things similarly marked. They would deny that there is anything identical in all men, in all substances, etc.; simply, we classify things by an arbitrary grouping, and we assign names to the groups. The **Conceptualists** admit more than identity in the name; but still, they admit nothing identical in the things—*e. g.*, in animals, in plants, etc. They admit similarities so close that we imagine them identical, and thus we conceive, say a lion, by a sort of vague or blurred phantasm, which will sufficiently represent any lion in general. This is not an idea at all, but merely a phantasm; besides, it is essentially relative, since the word *animal* will not call up the same phantasm in every mind; thus conceptualism has led to the modern theory of relativity of all human thought. "It is," remarks Rev. R. F. Clarke, S.J.,

"the central error of modern Logic, but it has a twin brother in Metaphysics no less subversive of truth. The radical and fundamental mistake of modern metaphysicians consists in the supposition that it is possible for two objects to resemble each other without having some *fundamentum in re*, something truly and really common to both of them in which this resemblance has its origin." (See *Amer. Cath. Quart. Review*, 1888, pp. 52, etc.)

185. **Thesis IX.** *The reflex universals are not mental images derived from universal objects physically existing, nor are they mere names, nor mere fictions of the mind; but they have a foundation in the reality of individual objects.*

First part. Not images of existing universal objects, as the exaggerated Realists maintain. *Proof.* Every object physically existing is a concrete and singular object, while universals are neither concrete nor singular. For instance, there is no concrete physically existing being which is a universal "body," a body that is neither large nor small nor middle-sized, neither white nor black, nor cold nor hot, etc. The universal has no definite accidents, but everything physically existing has definite accidents. Therefore there exist no physical universals.

Second part. Universals are not mere names, as the Nominalists pretend. *Proof.* A *mere* name, or oral term, has no mental term, or concept, corresponding to it; but universal names have each a concept corresponding to them and signified by them. If they had not, all the common nouns and the verbs of a language, and most other parts of speech, would be without any certain signification; for most words express universals, and the Nominalists suppose that universals are mere names to which no definite concepts correspond. But it is subversive of all certainty to maintain that nothing definite in meaning corresponds to most of the words of men.

Third part. Universals are not mere fictions of the mind, but they have a foundation in the reality of individual things. It is here maintained that universals express some one thing which is the same in many things; while the Conceptualists maintain that there is nothing the same, but only something similar, in all the individuals of a class.

Proof 1. Similarity is impossible without something that is one in the things similar. For similarity is, as Aristotle defines it, "unity in some quality"; things are similar inasmuch as, to a certain extent, they agree or are the same. Therefore, if all things of a class are said to be similar, they are really one to a certain extent; now, the universal signifies things by that in which they are the same—*e. g.*, animals, plants, etc.

Proof 2. If there were not some one thing common to all the individuals of a species, then the concept could not represent the nature of that species, but only something which is not the species, but is mistaken for it; and thus all our apprehensions of universals would be founded upon mistakes; all the words of a language would have a meaning, but a false meaning. Now, this leads to universal Scepticism. Therefore universals express some one thing which is found in all the individuals of a species or genus; therefore they have a foundation in the reality of individual things.

186. The now antiquated **mysticism**, taught formerly by Plato, consisted in a very peculiar theory on the origin of ideas. He supposed that the souls of men, before being united with their bodies, were in another state of existence in which they saw truths intuitively; afterwards, when united with their bodies, the souls retain the truths formerly perceived, but they are unconscious of their knowledge till sense-perception comes to awaken it anew. Plato could give no proof of his conjectures; his only reason for them was that he

could not in any other way account for the origin of our ideas.

187. **Ontologists** teach: 1. That the human soul has not in virtue of its own essence the power of knowing truth; 2. That this power must be supplied by a principle extrinsic to it; 3. That this extrinsic principle must be immediately present to the soul and directly intelligible, and must be of such a nature that in it all other things can be made intelligible to us; 4. That there can be no such being except God; 5. That our ideas, even our universal ideas, are not psychological, *i. e.*, formed by our souls, but ontological, *i. e.*, having objective existence, being the objects known to us. Still, many Ontologists allow that our mind can, by means of reflection, form to itself psychological ideas, which it can then compare with the ontological, thus knowing them to be conformable to the objective truth.

188. **Thesis X.** *Ontologism does not properly account for the origin of our ideas.*

Proof. That theory does not properly account for the origin of our ideas, 1. Which does not give a good explanation of known facts; 2. Which makes gratuitous and even false suppositions; 3. Which leads to false conclusions. But such is Ontologism.

1. *It fails to give a good explanation of known facts:* (*a*) It is a certain fact that our knowledge is intimately dependent on sense-perception; why is this so, if we see truth in God? (*b*) We know all things in connection with phantasms: bodily things by their own images, and things immaterial by reference to images borrowed from matter; why is this? The very terms applied to immaterial things are taken from material objects, *e. g.*, incomprehensible, immaterial; an acute, sharp, dull, clear intellect, etc. (*c*) We have no consciousness, even on reflection, that we see God; why is this, if we see Him?

2. *It makes gratuitous and even false suppositions:* (*a*) That actual finite beings are not cognoscible in themselves; why are they not cognoscible in themselves, if they have their own entity? (*b*) That we see things in God, and still we do not see God; why is this? (*c*) That we know God by species taken directly from Him, and other things by species taken from God; the opposite is evidently the case.

3. *It leads to false conclusions*; for, as entity and intelligibility are convertible terms, if finite things have not their own intelligibility, it will follow that they have not their own entity distinct from God's entity, that they are one with God; thus Pantheism is arrived at as a logical conclusion from Ontologism. In striving to refute this argument, Ontologists contradict and refute each other, and are divided into a number of schools: Malebranche claims that all things become intelligible to us by means of their archetypes, which we see in the Divine essence; Gioberti maintains that we do not behold the essence of God, but His creative act, *Ens creans existentias;* Rothenflue supposes that we see God "merely as being," *esse simpliciter*, etc. Therefore Ontologism does not explain the matter properly.

189. In connection with the study of ideas we must speak briefly of the expression of our ideas by words or **articulate language.** A word is an arbitrary articulate sign of an idea; therefore the same word has not the same meaning in different languages. Hence words cannot of their own force communicate our ideas to other men; but they are readily associated with ideas so as to become their inseparable companions. It would be incorrect to say that we cannot think without words: in fact, we often form ideas, judgments, trains of reasoning, and we experience feelings which we have no words to express, and deaf-mutes have no articulate signs at all. Still, thought without articulate language would be far less distinct,

more embarrassed in its process; and the minds of children would develop much more slowly and imperfectly if it were not for the use of speech.

190. As to the **origin of language**, it need not be to us a subject of vague speculation. We know from the historical account of Genesis that man had a language from the beginning, which he to a certain extent elaborated under the direction of the Creator (Gen. xix. 20); but he was then, before his fall, in a state of higher mental and bodily perfection than he is now. The question has often been discussed whether, with none but his present mental powers, man could have invented a language. No one doubts that it would have been difficult to do; it is even difficult now to make any decided improvement upon any nation's tongue. Still, there appears to be no conclusive reason to deny that it might, perhaps, have been gradually effected. To give a history of the supposed development of language, as Evolutionists sometimes attempt to do, is an idle task, always most unsatisfactory and never scientific.

CHAPTER III.

SENSIBLE AND RATIONAL APPETITE.

191. **Appetite,** in its widest sense, was, in the language of the Schoolmen, any tendency of a being towards a good suitable to its nature: (*a*) If the being does not apprehend the good to which its nature inclines it, its appetite was by them called *natural;* such is the tendency of a stone to fall down to the ground, of a plant to grow and produce fruit, the result being intended by the Creator. (*b*) If it apprehends the good by sense, the appetite is *sensible.* (*c*) If by reason, it is *rational* appetite or will. In English we never use the term *appetite* except for the tendency to sensible or to rational good.

192. The natural appetite of a being tends to what is essentially good for that being as a whole, and for the species; the **sensible and rational appetites** tend to the special good of sense and of reason; they are two distinct faculties, differing by their formal objects, viz., sensible and intellectual good.

193. An act is called **spontaneous** whenever the principle giving rise to it is in the agent; thus, all vital acts are spontaneous. In a stricter sense, however, only the acts of sensible appetite are called spontaneous; the acts of the rational appetite or will are termed **voluntary.** Now, voluntary is not the same as *free;* thus we voluntarily desire happiness, but we are not free to desire it or not.

194. **Freedom** is the absence of constraint. The absence of extrinsic constraint is *liberty from coercion;* even brutes may enjoy this. The absence of intrinsic constraint is

freedom from necessary action. This last is freedom or liberty properly so called: it enables our will to choose for itself between two alternatives; it is also styled *liberty of indifference.*

195. Sensible appetite as such, whether in man or brute, is not truly free; it is, indeed, free from extrinsic constraint, but not from intrinsic necessity. The reason is that its action is organic, the heart probably being its organ; and all organic action is subject to the physical laws of the material creation. When, therefore, an object is apprehended by sense as good, or delectable, or when the phantasm of such an object is aroused in the animal, the sensible appetite must, by a physical necessity, tend to that delectable good. Brutes, therefore, are entirely irresponsible for their appetites.

196. But man has an indirect power of controlling, to a certain extent, the workings of his sensible appetites; and he is in duty bound to regulate them by the law of reason. For good order requires that the superior faculty shall rule the inferior. Now, **man can indirectly control his animal appetites in various ways;** 1. He can avoid such external objects as would excite his appetites. 2. He can use in their stead objects that will affect him differently. 3. Even when he cannot change his material surroundings, he can recall phantasms of a different tendency. 4. He can withdraw his attention from any particular objects or phantasms. 5. He can often, by a powerful effort of his will, compel his sensible appetites to a reluctant obedience. 6. He can control his members so as not to yield obedience to his animal appetites.

197. The **essence of liberty** consists in this, that, when everything is ready for action, the will has still a choice of its own with regard to the action. Man can exercise that choice in various ways: he may choose to act or not to act,

to take one thing or its contrary, or to select between things not opposite to each other; technically he has liberty of *contradiction*, liberty of *contrariety*, and liberty of *specification*.

198. **Thesis XI.** *The will of man is free, not only from coercion, but also from necessary action.*

Explanation. We do not maintain that we are always free in every respect—for instance, we cannot help desiring our own happiness—but we are free with regard to particular means of seeking our happiness. The liberty of man is true liberty, in the meaning explained in the preceding paragraph.

Proof 1. We have a clear and invincible consciousness that we often will things when we could restrain ourselves from willing them, or could will something different or the contrary of them. We experience this consciousness: (*a*) Before we make our choice, when we notice that we could delay our choice and take longer time to consider, or act at once without further delay; even when we are going to act, we know that we can take one thing or another. (*b*) In the act of choosing we distinguish between necessity and free choice; when we choose freely, we are conscious that our decision is our own, of which we assume the responsibility, and that we could, if we would, choose differently. (*c*) After our choice, we are conscious that we have done morally well or ill, that we have reasons for self-reproach or for self-approbation. Now, consciousness is an infallible motive of certainty. (*Logic*, No. 116.)

Proof 2. We judge without any fear of error that others also are responsible for their choice. All men agree with these judgments—witness the laws, tribunals, histories, etc., of all nations.

Proof 3. When we submit one of our free acts to a scientific analysis, we understand that it must be free. For the will is presented by the intellect with the choice between

things which the intellect proposes as desirable in some respects and not desirable in other respects, and not necessary just now. Our intellect does not then compel the assent of the will to any particular choice; still, our choice is made; the reason, therefore, of the choice must be in the will itself.

199. **Objections:** 1. "The essence of that which is improperly called the free-will doctrine is that, occasionally at any rate, human volition is self-caused—that is to say, not caused at all" (Huxley, "Science and Morals"). *Answer.* We deny it. This is a play on the word *self-caused:* the act of volition is not caused by the act of volition, which it would be if it were self-caused; but the act of volition is caused by the faculty of the free will. It is true that matter cannot determine the nature of its action; but it does not follow that a spirit cannot do so. Rather, from the fact that matter cannot determine its action, and our soul can, it follows that our soul is not matter; to avoid granting this logical conclusion, Huxley finds it necessary to deny the liberty of the will.

2. Consciousness testifies to the existence of our acts, not to the manner nor the causes of our acts, therefore not to their liberty. *Answer.* Consciousness often testifies to the manner of the act as well. Besides, we are conscious of our acts by which we decide between different courses of conduct; *i. e.*, the direct object of our consciousness is the exercise of our liberty: we are conscious that we make a free choice.

3. We mistake spontaneous action for free action. *Answer.* We clearly distinguish between *free* and *not free;* thus, we do not call the pleasure free which we find in food, though our perceiving it is spontaneous.

4. We cannot help choosing what we like best; therefore we are not free. *Answer.* If this means that we cannot help preferring what we prefer, we cannot choose and yet not choose a thing, it is true, but not to the point. But if it means that we cannot help choosing that which holds out the stronger attraction, it is false; if it were true, no one would be accountable for his action, all mankind would be in error about moral good and evil, our own consciousness would deceive us, etc.
5. If we could choose what holds out the weaker attraction, that choice would be without a reason, but there is nothing without a reason for it; therefore we always choose what is more attractive. *Answer.* The reason for choosing what is less attractive is not that it is less attractive, but it is reason enough that it is attractive at all, and therefore capable of exciting our appetite.
6. Our will always obeys our last practical judgment; but our judgment is not free. *Answer.* Our judgment may be influenced by our free will, as when we make ourselves believe that a thing is right because we like it; in this case our judgment is free. But if the objection means that our will always obeys our last practical judgment, which is entirely independent of our will, the statement is false. We know that, when our intellect tells us we ought to do one thing, we can still do another; we can also choose what we judge to be less useful or less agreeable.
7. God knows what I shall do to-morrow; therefore I must do it. I am not free. *Answer.* God knows it, because I will freely do it: knowledge is by nature consequent on the fact known and does not in the least influence the fact.

8. Statistics show that the same average of crimes occurs each year, therefore such things obey a necessary law. *Answer.* Statistics may show some remote proportion between temptation and crime; but no more than can be explained by the fact that men, even though free in any single case, are more inclined habitually one way than another, and that there is a certain uniformity in the circumstances which tempt men to the commission of crimes.

CHAPTER IV.

THE NATURE OF THE HUMAN SOUL.

200. **Thesis XII.** *The soul of man is essentially a simple being.*

Proof. Our soul takes in simple ideas; for instance, those of truth, holiness, justice, infinity, being, etc.; but a principle that can take in or conceive a simple idea is simple. For if it were composed of parts, then either, 1, *Each part would take in the whole idea;* each part would be a soul, and every man would be not *I* but *we*, which is against the testimony of consciousness and of common sense; or, 2, *Each part would take in a part of a simple idea;* but a simple idea is not an aggregate of parts; or, 3, *Only one part would take in the whole idea*, the other parts not apprehending it; then the part apprehending the simple idea would be the soul. If this part is simple, the soul is simple, as we maintain it is. But if that part is itself compound, the same reasoning must again be applied to it; and the absurdities arising cannot be avoided except by granting that the principle which conceives simple ideas is simple, or that the soul is simple.

201. **Objections:** 1. A simple soul is unthinkable, *i. e.*, cannot be thought of, says Huxley. *Answer.* It is unimaginable, not unthinkable; if we could not think of it, we could not point out the essential notes by which it is distinguished from all other beings.

2. Our intellect is affected by our bodily ailments; it may be disorganized, deranged, enfeebled, excited, etc.;

therefore it consists of parts. *Answer.* The intellect itself cannot be deranged, but its co-natural objects are presented to it by the phantasms of our imagination. Now, our imagination can be deranged, for it is an organic power; and in reality all mental derangement, enfeeblement, excitement, etc., can be traced to affections of the imagination.

3. Phrenology shows that all action of the soul is modified according to the modifications of the brain; therefore the soul is identified with the brain. *Answer.* Phrenology is not founded upon certain principles; therefore it is not a science and cannot draw scientific conclusions. Elevations in the brain do not always correspond to elevations in the cranium, nor do mental dispositions always correspond to special modifications of the brain. Even if they did, it would only prove that the action of the soul is modified when its organ is affected; for the brain is the organ of the imagination; and the imagination exerts an extrinsic influence on the understanding, presenting to it the images that assist thought.

202. **Thesis XIII.** *The soul of man is spiritual.*

Explanation. Spirituality expresses more than simplicity; every spirit is simple, but a thing may be simple without being spiritual; such is the soul of the brute. (See No. 145.) A being is spiritual when it can act and exist without material organs.

Proof 1. The soul will actually survive the body, as will be proved further on (Nos. 213, 214); this supposes that it can exist and act without the body; therefore, that it is spiritual.

Proof 2. The soul, even now, performs acts in which matter cannot have an *intrinsic* share; for instance, when we conceive such ideas as virtue, holy, honest, will, intellect, God, angel,

spirit, etc.; also when we love spiritual good, which cannot affect any organism. In fact, all abstract, all universal ideas are beyond the reach of matter; for matter being essentially concrete and singular cannot represent any but concrete and singular objects. Likewise all judgments, reasonings, volitions, every act that is distinctively intellectual, is inorganic in its essence; the imagination does furnish it with materials extrinsically, but cannot enter into its specific action. Now, it is evident that a being acts according to its nature; therefore the nature of the intellect is spiritual, distinct from matter, independent of matter in its own specific sphere of activity; therefore intrinsically capable of acting and existing without a body. The argument may be stated thus: An organic faculty—*i. e.*, a faculty which has matter as a con-cause of its operations—can only perceive such objects as can make a material impression upon it; but our intellect perceives objects which cannot make a material impression upon it; therefore our intellect is not an organic but a spiritual faculty. But a faculty is necessarily proportioned to the subject in which it resides; therefore the soul is spiritual.

Proof 3. No being can tend to a good which is above its nature; but the soul tends to spiritual goods, essentially above all material natures; therefore its nature is spiritual.

Proof 4. Matter cannot act freely, as materialists grant; but our soul acts freely, as proved above (No. 198); therefore our soul is not matter.

Proof 5. Our soul is conscious of its own acts; but consciousness supposes inorganic action and inorganic being. For an organ cannot inspect itself, a being dependent intrinsically on matter cannot double itself back on its own acts; therefore the acts of consciousness and the nature of a conscious soul are spiritual.

203. **Objections:** 1. All intellectual action begins in

sense, therefore the soul is dependent on the body for all its acts. *Answer.* The soul is, in our present state of existence, extrinsically dependent on the body in more than one way. viz.: for its communication with the visible world, for its phantasms, and for the exercise of its faculties generally; but since matter does not intrinsically co-operate in its intellectual acts, there is nothing impossible in the separate existence and action of the soul, without the extrinsic aid of the body.

2. The soul is the form of the body; therefore its very being is the being of the body. *Answer.* Though it makes one being with the body, still its being is not exhausted by the being of the body; in other words, it is the form of the body, but it is not only the form of the body; it is more.

3. Whether the aid of organs in the acts of the intellect be called intrinsic or extrinsic, it is necessary for intellectual action; therefore the soul cannot act without the body. *Answer.* The aid of phantasms is now necessary, because every being acts dependently on the circumstances in which it is placed; thus, when we are in a room, we depend on the window to see objects outside. The soul, therefore, being at present one being with its body, must now act in union with that body, using the aid of that body as far as it can aid the act of intelligence. Therefore we now think of all things in connection with phantasms. When, however, the body will be no more one with the soul, the latter can retain all its intellectual species formerly acquired; it can know its own essence directly, and, by reasoning on all this, know its Creator; besides, it can receive divinely infused knowledge, and knowl-

edge communicated to it by other intelligences in manners suitable to its new condition.

204. **Thesis XIV.** *The intellectual soul is the only principle of life in man, and is therefore the form of the human body.*

Explanation. It was proved above (Thesis V.) that the vital principle of any living body is truly the form of that body; if, then, we prove here that the intellectual soul is the only vital principle in man, we thereby establish the fact that the soul is the form of the body. Now, the intellectual soul is really the only vital principle in man.

Proof 1. Every man is conscious of being a unit, which he signifies by the term 'I'; he is conscious, moreover, that the same 'I' feels, and thinks, and wills. Now, if there were more than one vital principle in man, the intellectual soul could not be conscious of all this; for vital principles perform immanent actions, and one principle cannot be conscious to itself of performing the immanent act of another principle, conscious of doing what it does not do.

Proof 2. The more the intellect works, the more the inferior vitality of a man is relaxed; on the other hand, when the lower functions of life are most energetically exercised, the mind is less fit for its own activity. Thus, while wrapped in deep thought, a man scarcely sees or hears; he digests imperfectly. Now, all this cannot be explained except by supposing that the same principle performs the higher and the lower functions of human life.

Proof 3. Anatomy shows that the entire organism of the human body is one unit, combining the organs of vegetable and animal action into one harmonious whole.

205. **Corollaries.** 1. The soul is in every part of the body, acting in every organ with a vitality appropriate to such organ; seeing in the eye, hearing in the ear,

breathing in the lungs, digesting in the stomach, moving in the muscles, etc.

2. All organic action in man is the action of the compound soul and body; for matter can do nothing except in virtue of its form.

3. The soul is directly united with the prime matter or potential principle, being itself the active principle: it gives to the body all its powers and its very nature of a body, and such a body. Still, when the soul departs at death, the body cannot cease to be a body of some kind; for the potential principle of matter cannot exist without a form. Whether this new form be one form for the whole corpse, a form supplied for the purpose by the laws of nature, or whether the flesh, bone, sinew, etc., have each its own form, existing before death under the control of the life principle and now acting independently, matters very little. (Pesch, *Inst. Phil. Nat.*, No. 210.)

206. Those who do not understand the Peripatetic system of matter and form are greatly embarrassed to explain **how body and soul act on each other.** Various theories have been imagined, all of them unscientific. Plato supposed that the soul is *seated in the brain*, whence it rules the body as the rider does his horse. The *assistance* theory of Descartes maintains that soul and body do not act on each other, but God acts on either one of them whenever a modification occurs in the other. Leibnitz's theory of *pre-established harmony* teaches that God, foreseeing all that any soul would do in the course of life, has in his wisdom given to each soul a body so constructed that it will automatically act just when and as the soul wills, though the soul does not influence it in the least. The theory of *physical influence* makes the soul and the body act on each other as two distinct beings.

Günther imagined a principle of animal life, called by him *psyche*, which he supposed to be substantially united with the intellectual soul. No system can be scientific which makes man to be, not one but two beings, each having its own activity; the only theory in harmony with man's essential unity is that which views the soul as the form of the body. The form is not acted upon by the body, nor does it act on the body; but it is itself the active principle of the body. Thus, the soul is not acted upon by the eye or the ear, but the living eye, the living ear acts, perceiving color and sound. The whole question about the interaction of body and soul thus ceases to be a question at all; for there can be no interaction where there are not two agents each having its own action, but the action is common to both.

CHAPTER V.

ORIGIN AND DESTINY OF THE HUMAN SOUL.

207. Many ancient philosophers, finding the soul of man so evidently and immeasurably elevated above the entire material creation, erroneously conjectured that it, in some way or other, must have **emanated** from the very substance of the Divinity. To-day a very different error has not a few advocates among the votaries of the physical sciences: they imagine that man may be a mere **evolution** of the brute, and the highest step in a universal movement of evolution.

208. The most popular shape in which this vagary has found favor with the modern public is the **Darwinian theory,** which may be stated thus: All plants and animals, man included, are evolved from inferior species, and, as many of Darwin's disciples add, ultimately from unorganized matter, by means of *natural selection.* The process of natural selection is as follows: All plants and animals tend to increase their numbers in a geometrical progression; hence arises a severe *struggle for existence,* in which contest nature causes the weakest individuals and species to perish, and the best-constructed to multiply, thus producing the *survival of the fittest.* Consequently, organic life must ever be ascending in perfection, and lower species have thus been developed into higher species. (See Mivart's *Genesis of Species,* pp. 17, 18.) This theory is interesting and ingenious; but its disastrous consequences to morality, to religion, to social life, and to individual happiness for time and eternity are so obvious, that noth-

ing but the most convincing evidence of its truth could possibly excuse those who love to disseminate its noxious principles.

209. And yet the Darwinian theory, far from being established beyond a doubt, is totally devoid of demonstration, and is **a mere figment of the intellect.** Charles Elam, M.D., after an accurate analysis of facts in three articles of the *Contemporary Review*, continues thus (Dec., 1876, p. 132): "The conclusions which necessarily follow from the foregoing observations may be briefly summed up in one syllogism, embracing not only Natural Selection, but also the larger theme of Organic Evolution generally:

"'Without verification a theoretic conception is a mere figment of the intellect' (Tyndall's *Fragments of Science*, p. 469).

"But the theory of Organic Evolution is an unverified conception.

"Therefore Organic Evolution is a mere figment of the intellect."

To prove the minor, we may quote the rule laid down by Huxley, that the only way in which any hypothesis of progressive modification can be demonstrated is "by observation and experience upon the existing forms of life." Now, he grants in the same paragraph that the Darwinian hypothesis has not yet received such demonstration. (*Lay Sermons*, p. 226. See further Mazzella's *De Deo Creante*, Disput. iii. art. i. § 3.)

210. We have proved above (Thesis VIII.) that the species of plants and animals are fixed, incapable of transformation. With regard to the evolution of man, in particular from a lower animal species, and of the intellectual from the sensitive soul—the main point with which we are here concerned—we add the following:

Thesis XV. *The gulf between brute and man is absolutely impassable by any process of evolution.*

Proof. The brute animal is entirely material: though it is animated by a simple soul, still that soul is only the substantial form of the body, the principle of bodily action and nothing more; it can neither exist nor act except in matter, so that all its life, all its activity consists in material modifications of a material organism. This much is admitted by modern philosophers and scientists generally, as well as by the Schoolmen. Now, what is merely material can never be developed, whether by the Darwinian process or by any system of evolution, into a spiritual being; or, which is the same thing, matter cannot possibly be evolved into a thinking, a reasoning being. For all evolution is merely a modification of matter; but matter in all its modifications remains matter; therefore evolution of matter cannot produce anything but matter. Now, matter cannot possibly reason; for reasoning implies universal ideas, since at least its middle term must be distributed (*Logic*, No. 32); and matter cannot conceive a universal idea. For an idea is an image of the object, and every image in matter can only be a concrete image of a concrete and singular thing; while a universal idea is an abstract image of what is neither concrete nor singular, and therefore cannot possibly be imaged in matter. Therefore matter can never become capable of reasoning. But our soul reasons; hence a material being can never be evolved into the human soul; or, the gulf between brute and man is absolutely impassable by any process of evolution.

As a fact, evolutionists find it impossible to account, in their theories, for the spirituality of the human soul; hence they either deny this spirituality, believe in nothing but matter, and become Materialists; or they refuse to draw the logical conclusions which flow from their false principles, and, to veil their inconsistency, they assume the sceptical position of Agnostics.

211. **Thesis XVI.** *The soul of man cannot originate except by creation*, i. e., *by being made out of nothing.*

Proof. If it were made out of anything, this would be material or spiritual. It can be neither: 1. *Not material;* for, as we have just proved, no change in matter can fit it for the acts of thinking. 2. *Not spiritual;* for it cannot be made out of a part of that spirit, since a spirit has no parts: nor out of the whole of that spirit, which would then cease to be when the soul begins to be. Among all the wanderings of genius, no philosopher has ever maintained that the soul is made out of a previous spirit which then ceases to exist. The human soul, therefore, cannot be made out of another being; hence it is created, made out of nothing.

212. As to the question **when the souls of men are created,** Plato supposed that all human souls lived before in the stars, whence they were banished for crime; others have taught the transmigration of souls from one body into another, even into brutes, as a punishment for their moral degradation; Leibnitz and Wolf pretended that all human souls were created in the beginning of the world, but remained without intelligence till united to their destined human bodies. All such theories are destitute of proof and even of plausibility. Why should a soul exist before it can do work suited to its nature? **The scientific answer** is that which is derived by careful reasoning from known facts. The soul of each man must begin to exist when its work begins. Before biology became a science, it was supposed that the human soul was not created till the body was sufficiently organized—first by a previous vegetative, and next by a merely animal soul—to become the fit organism of that higher principle which was to build it up into a distinctively human body. That principle was the intellectual soul. At present it is far more probable that the rational soul is created, and made the substantial form of the

body, from the very moment of conception: the infant of a day has already an immortal soul; hence the wilful destruction of its life is murder.

213. **Thesis XVII.** *The human soul does not perish with the body.*

Proof 1. This is one of the most universal judgments of common sense.

Proof 2. The justice and the wisdom of God require that there shall be a sufficient sanction for the moral law—*i. e.*, that there shall be such rewards for virtue and punishments for vice as shall make the good ultimately much happier than the wicked. But such a sanction does not exist in this world, where the virtuous are often oppressed, despised, persecuted unto death; therefore it must exist in a future life.

214. **Thesis XVIII.** *The human soul is immortal.*

Proof 1. The Creator has given us a longing for a never-ending existence, an endless happiness; but He could not have done so if our souls were not really destined for an endless life. For it would be unworthy of His goodness to give us a longing after a great good, which we could not possibly attain; and it would conflict with His truthfulness to give us, in such natural desires, an implicit promise of immortality, if He did not enable us to attain it.

Proof 2. A spiritual being is capable of acting and existing for ever; in fact, immortality is natural to it, because, having no parts, it cannot be dissolved or corrupted as to its substance. Therefore it is natural for it to exist till it be annihilated by its Maker. But the Creator can have no reason to annihilate it, as long as it can answer the purpose of its existence; now, it can answer that purpose for ever, by showing forth the justice, the power, and the goodness of God, and thus contributing to His external glory. God makes nothing useless; but the natural indestructibility of the soul

would be useless if God should annihilate it, no matter after how long a period.

215. Can we prove that **the souls of the wicked shall suffer for ever,** that the pains of the lost are eternal? We can certainly prove by reason: 1. That it is natural for all spirits to exist for ever; 2. That God is not bound to destroy those who He intended should glorify Him throughout eternity; 3. That a being which freely fails to attain its destined happiness must naturally expect to be disappointed for ever, and can only blame itself for its unhappiness; 4. That God is not bound to give new chances to a free creature which has with full deliberation rejected His sincere offers of beatitude; 5. That it is proper for every immortal being not to be in a provisionary state for ever, but to come sooner or later to a definite and final condition, and to remain in the same for eternity; 6. That there would be no complete sanction of the moral order, if the punishment of such as will persevere in their wickedness till the end would not last for ever; 7. That no motive but the dread of eternal punishment is under all circumstances sufficient to restrain man's passions. Hence it is abundantly proved that reason itself appears to demand eternal punishment for those who die in a state of rebellion against their Maker.

216. Those who deny the spirituality and, consequently, the immortality of the soul are called *Materialists*, since they admit nothing but matter in the world. Many recent writers, anxious to disclaim this odious title, have invented the less unpopular appellation of **Agnostics.** "I called myself an Agnostic," writes Huxley. "Surely no denomination could be more modest and appropriate" (*Lay Sermons*, p. 294). These strive to evade the arguments of all sound philosophers by pretending that such questions as concern the existence of God, the nature of the soul, its future destiny, etc.,

are too deep for our investigations. Still, while pretending to keep aloof from such matters, they are constantly alluding to them, arguing against the great truths of philosophy in a covert manner. They do not prove their thesis, but they take it for granted, calling God the Unknown, as if no man knew anything about the necessity and the greatness of the Creator, sneering at the spirituality of the soul, as if it were a self-contradiction, etc., etc.

217. **Thesis XIX.** *Agnosticism is destructive of all sound Philosophy.*

Proof. That system is destructive of Philosophy which renders all the most important inquiries impossible: in particular, which denies that we can know anything certain about the existence of the soul as distinct from the body, of a future state, of a wise and personal God, the rewarder of good and evil; and which, consequently, makes it doubtful whether there is anything worth living for beyond the gratification of the passions. For Huxley himself admits that "The question of questions for mankind, the problem which underlies all others, and is more deeply interesting than any other, is the ascertainment of the place man occupies in nature, and of his relation to the universe of things. Whence our race has come, . . . to what goal we are tending, are the problems which present themselves anew, and with undiminished interest, to every man born into this world" (*Man's Place in Nature*, p. 57).

Now, Agnosticism renders all such inquiries futile and such questions incapable of satisfactory settlement. The same writer acknowledges this: "Why trouble ourselves about matters of which, however important they may be, we do know nothing and we can know nothing?" (*Lay Sermons*, p. 145).

The Mental Philosophy of the Schoolmen, so far briefly

outlined, answers all these questions clearly and without hesitation. Its voice comes to us from the most distant past, strengthened by the approving accents of all intervening generations.

The advancement of true science, so far from having weakened its teaching, has strikingly confirmed, and daily confirms more and more, the truth of its doctrines. It alone satisfies the reason and the heart of man.

BOOK IV.

NATURAL THEOLOGY.

218. **Natural Theology** is our study of God by the light of reason, without the direct influence of supernatural Revelation. We exclude the direct, but not the indirect, guidance of Revelation; for no earnest investigator of truth will close his eyes to the bright light of Divine teaching, and prefer to grope his way by the faint glimmer of unaided reason. We live in the full blaze of Christian civilization, which it were folly to ignore. We set out, therefore, in the pursuit of wisdom, not as pagan sceptics in quest of the unknown cause of this world, if perhaps there be such a cause, but as enlightened Christians, who wish reverently to investigate what our reason can understand about a matter so far above us, viz.: the nature and the perfections of the Creator, and the relations in which He stands to His creatures.

We shall consider: 1. The existence of God. 2. His essence. 3. His quiescent attributes. 4. His operative attributes.

CHAPTER I.

THE EXISTENCE OF GOD.

219. We shall begin by considering God as He is most obviously conceived by man, viz., *as the first and intelligent Cause of the universe, and the Supreme Lord to whom we are all responsible for our moral conduct.* Those who refuse to acknowledge the existence of God are called **Atheists**: *practical* Atheists deny Him by their conduct, and *theoretical* Atheists in their speculations. Unfortunately there have been many practical Atheists; but those of the theoretic kind have been comparatively few, and none of them conspicuous for virtue. The **Agnostics** are a very recent school of physical scientists, rather than of intellectual philosophers, who do not deny that God exists, but pretend that His existence cannot be validly demonstrated.

We are to prove in this chapter that the existence of God, such as He is most obviously conceived by man, is absolutely certain. Various proofs may be given; we select the following, which we present in bare outline:

220. **Thesis I.** *The existence of God can be demonstrated by metaphysical, physical, and moral arguments.*

Proof 1. The **metaphysical argument** considers God as the first efficient cause of this world; it may be thus proposed: the world is a system of contingent beings; but no contingent being can exist without a necessary being which is its first efficient cause; therefore a necessary being exists which is the first efficient cause of the world.

We prove the major: A contingent being is one that may exist or not exist as far as its own nature is concerned—in other words, a being that is not self-existent. But the world is not self-existent, as was proved in *Cosmology* (No. 103). Therefore the world is a contingent being.

We prove the minor: There can be nothing without a sufficient reason; hence a contingent being must have a reason for its existence. But that reason is not in the contingent being itself; therefore it must be in another being. This is its cause; for a cause is a being that influences the existence of another being. Now, if that cause is a necessary being, then our proposition is proved; if it be not a necessary being, then it is contingent, and therefore must have a cause, as we have just proved. Thus we must go on reasoning, till we come to a first cause which is not contingent but necessary; or we must suppose that there has been an infinite series of contingent causes without any necessary cause. But besides the fact that such a series is absurd (because an infinite series in the past could never have come to a particular effect, since the infinite can never be passed through or left behind), even if it were not absurd, it would be inadequate to produce such an effect. For a multitude of contingent beings without a necessary cause could not have a sufficient reason for existence; since contingency is the want of an intrinsic reason for existence. Therefore no contingent being can exist unless there exists a necessary being which is its first cause.

221. *Proof* 2. **The physical argument**, supposing it proved that the world is contingent (No. 103), views God as its intelligent cause, and proves His existence from the physical order conspicuous in the world; it is this: There exists in the world a most wonderful order, or adaptation of means to ends: (*a*) to particular ends, as of the eyes to see, of the ears to hear, of the tongue to suit various purposes, etc.;

(*b*) of all the parts to a common end, viz., to the preservation of the whole. Now, such adaptation, visible in the world, requires intelligence in its cause, and even an amount of intelligence proportionate to the vastness, the variety, and the perfection of the order produced; therefore the first Cause of the world must be intelligent beyond all our conception.

The *minor*, viz.: order in the effect requires intelligence in the cause: (*a*) It is analytically certain; for a disposing of means for an end implies the intellectual perception of the relation existing between means and end, and therefore it requires intellect in the cause. (*b*) It is attested by the common consent of mankind; for no one could believe, *e. g.*, that letters or type put down at random would produce a grand poem. (*c*) It is always insisted on as a certain truth, even by the Agnostics in their scientific researches; for, when they find any fossil which has a regular shape or mark, they claim it as an undoubted proof of human, *i. e.*, intelligent, workmanship. Therefore order in the effect supposes intelligence in the cause.

222. *Proof* 3. **The moral argument** proves that there is a supreme Lord to whom all men are responsible for their moral conduct. It is as follows: All men when in the full possession of reason, in any part of the world, in all stages of society, among all races, even among newly discovered tribes, agree in the firm conviction, which acts as a constant check on their passions, that there exists a supreme Lord and Master to whom they are responsible for their moral conduct. Now, this firm and universal judgment cannot be erroneous; else it would show that it is natural for man to judge falsely, and the human intellect, instead of being the faculty of knowing truth, would be the source of a universal deception.

223. **Objections: I. Against the metaphysical argument.**

1. This argument is too abstruse to be reliable. *Answer.* It is, on the contrary, an obvious application of the analytical and common-sense principle of causality: everybody judges as readily that the world must have had a first cause as that a house must have had a builder.
2. Science must confine itself to the tracing of physical effects to physical causes. *Answer.* Physical science may do so, but philosophy must investigate the highest causes.
3. Evolution can account for all things physical. *Answer.* Evolution does not even touch upon the real origin of the world, but only on its development; even if the theory of evolution were true, there would still have to be a Creator of matter before that matter could begin to change its forms.
4. A self-evolving world might be a necessary being. *Answer.* Impossible. The series of evolutions must have had a beginning, a first stage; if that stage were necessary, then it could not change; besides, the world is proved in *Cosmology* (Thesis I.) not to be self-existent.
5. Although every single being in the world were contingent, the whole collection might be necessary. *Answer.* There can be nothing in the collection which is not supplied by the parts, especially when it is essentially excluded from the parts. Besides, the collection is both finite and mutable, and a necessary being is not such. (No. 103.)
6. From the existence of a contingent being we cannot conclude to that of a necessary being; for we should thus have more in the conclusion than in the premises,

viz., the necessary in the conclusion and only the contingent in the premises. *Answer.* We have the necessary being in the premises; for we have in the major that everything existing must have a sufficient reason, and in the minor that only a necessary being can truly be the ultimately sufficient reason of contingent beings.

7. There is no proportion between a contingent and a necessary being. *Answer.* There is no proportion of entity, but one of necessary dependence.

224. **Objections: II. Against the physical argument.**

1. Not every thing in this world exhibits the disposition of means to an end. *Answer.* It is enough for our argument that many things do.
2. But many things are evidently out of order; therefore it is clear that the Creator is not very wise. *Answer.* More than enough order is conspicuous in the universe to prove the Creator immensely wise, beyond all our conception. Besides, it cannot be proved that anything is out of order: a thing may not be arranged in the way that we might prefer; and yet it may, for all we know, be excellently arranged. Similarly, an ignorant man may not see the use of all the tools found in an artist's studio, but it would be foolish for him to say that they were useless.
3. But a world created by an infinitely wise and good God should be perfect. *Answer.* It should be relatively but not absolutely perfect. (No. 117.)
4. But the order of the world proceeds from the physical laws, and these result from the natures of the bodies; thus there is no need of an intelligent Ordainer. *Answer.* The natures of bodies proceed from the Maker of them: if they are well suited to

their ends, it is because the Creator has so suited them.

5. All the order of nature may be a mere accident. *Answer.* This would mean, in other words, that the most wonderful effect may be without a sufficient cause; for blind chance is not a sufficient cause of order.

6. The order of nature results from evolution by means of natural selection, the survival of the fittest, etc. *Answer.* If it were true that such evolution had taken place, it would only make the order displayed in the world more admirable; for he who would make a machine of such a nature that it should evolve a number of other machines in wonderful variety, and in an ever-increasing perfection of details, would thereby exhibit far more intelligence than if he were to make all these machines separately. Therefore this objection, whether true or false, is not against our thesis.

7. An adaptation of means to an end does not require intelligence; *e. g.*, the bee without intelligence builds its honey-comb most symmetrically. *Answer.* The bee and all brute animals, in following irresistibly the promptings of their instincts, display the wisdom of their Maker, just as a machine displays the skill of the inventor.

225. **Objections: III. Against the moral argument.**

1. Our judgments concerning our moral duties and responsibilities are due to education. *Answer.* They may be developed and perfected by education; but they are so essential to man that they are known even without education and amid all varieties of education.

2. This sense of responsibility comes from some passion or other, *e. g.*, from an idle fear of punishment. *Answer.*

The passions would rather prompt a man to throw off restraint, to do what he likes, while it is our moral judgment that is a constant check upon our passions. As to the fear of punishment, it is a consequence, not a cause of our sense of responsibility.

3. The sense of responsibility simply results from the intellectual apprehension of right and wrong. *Answer.* It also implies the judgment that there is a law obliging us to do the right and avoid the wrong, and that there is a Law-giver who enforces this law, for there can be no law without a law-giver.

4. There have always been atheists; therefore the judgments in question are not universal nor essential to man. *Answer.* We grant that there have been in many ages practical atheists; there have also been a comparatively small number of theoretical atheists, who maintained for a portion of their lives that there is no God. Some of these may, perhaps, have convinced themselves, or may have been convinced by others, that the existence of God was doubtful; but history does not tell of any sensible and sincere man who felt an habitual conviction through life that he was not responsible for his moral conduct to a supreme Being.

5. We find learned men who are really convinced that man is only matter, and therefore irresponsible for his acts. *Answer.* From the fact that such men as Pyrrho, Hume, Fichte, Berkeley, etc., argued against the certain existence of bodies, it does not follow that they firmly believed in their own theories; so, likewise, it does not follow from all the theorizing of materialists that they *bona fide* consider themselves as irresponsible heaps of matter, unless it be that abnormal

surroundings, or abnormal conditions of mind or heart, have extinguished in them the ordinary light of conscience. We do not know whether such a case is possible; but if it be, it is not from abnormal states that the judgments of man's common sense can be gathered.

226. Some pretend to prove the existence of God *a priori.* Now, to reason *a priori* means to reason from a cause to an effect; and as God has no cause, His existence cannot possibly be proved by such a process. But such theorists confound an *a priori argument* with an *a priori judgment;* they really mean that the judgment 'God exists' is *a priori*, or analytical. This is called the **ontological argument,** because it pretends to prove the existence from the very essence of God. This argument is specious but fallacious, and the more to be reprobated because the matter is so important. For those who see through the fallacy may be led to suspect that the existence of God is incapable of solid proof.

227. The ontological argument has been **variously proposed** by well-meaning men, such as Descartes, Leibnitz, and even by St. Anselm; it always comes to this: "God is the infinitely perfect Being; but the infinitely perfect Being exists, else He would not be infinitely perfect; therefore God exists." The middle term 'infinitely perfect Being' is ambiguous; in the major it is taken *abstractedly—i. e.*, it is a mere definition of the abstract term 'God'; the existence is not meant to be asserted even implicitly, but only referred to conditionally, *i. e.*, if He exists. In the minor the same middle term is used with a new meaning, *i. e.*, **concretely** and, as including existence, unconditionally. It is a trick of logic, which may escape the detection of many, but it is nevertheless a sophism.

It is true that the existence of God is immediately know-

able in itself; it is even the first truth in the *ontological* order; but it is not immediately known to us, *i. e.*, in the *logical* order, but it becomes known to us by means of an obvious process of reasoning *a posteriori—i. e.*, from the effects to the first Cause.

CHAPTER II.

THE ESSENCE OF GOD.

228. The **essence of a thing** is that which constitutes it intrinsically, making it what it is; it is the note or notes without which a thing can neither exist nor be conceived.

We shall consider in this chapter: 1. The difference between the physical and metaphysical essence of God. 2. The infinite perfection of His physical essence. 3. The simplicity of His physical essence.

ARTICLE I. PHYSICAL AND METAPHYSICAL ESSENCE OF GOD.

229. **The physical essence** is the essence viewed exactly as it is in the being itself, not introducing into it such distinctions as do not belong to it in the objective reality. Now, there are no real distinctions in the essence of God, as we shall show further on; therefore His physical essence is simply the sum total of His perfection.

230. But **the metaphysical or notional essence** of a being is its essence as conceived by us, *i. e.*, as it is traced out by our mind, and marked out in different perfections with logical distinctions, which are not objectively real, though they have a foundation in the reality. The metaphysical essence is viewed as distinguished from the attributes, and, in a created being, as distinguished from the accidents. In God there are no accidents; for He necessarily is all that He is. Now,

the essence as distinct from the attributes is conceived as, (*a*) so proper to a being as to distinguish it from every other being, and (*b*) so primary that all the attributes flow from it.

231. **The metaphysical essence of God**, therefore, must be that perfection in God which is conceived by our finite intellect as, (*a*) so peculiar to God that it distinguishes Him from all other beings, and (*b*) so primary or principal that all His other perfections flow from it. Now, this perfection seems to be *self-existence*; for (*a*) it distinguishes God from all other beings, since a self-existent being can be proved to be necessary, independent, infinite—in a word, to be God; and (*b*) it is primary in Him, since from it all His other perfections flow and can be logically proved.

232. We have said that **God's physical essence** is the sum total of His perfection; and we shall now proceed to prove two theses with regard to it: 1. That God contains all possible perfections in an infinite degree. 2. That there is no real distinction of any kind between those perfections.

233. **Thesis II.** *God is infinitely perfect.*

Explanation. We mean by a *perfection* any real entity, anything which it is better to have than not to have. A being is infinitely perfect when it has all possible entity in the highest possible degree. It is clear at once that God, being the cause of the world, must have all the perfections that are actually in the world; for there can be no perfection in the effect which is not in the cause. But besides, He must have, we maintain, all perfections that are intrinsically possible, *i. e.*, all that imply no contradiction. We must, however, distinguish between *pure* perfections—*i. e.*, such as imply no imperfection, *e. g.*, knowledge, goodness, justice, power, etc.; and *mixed* perfections—*i. e.*, such as imply some imperfection, *e. g.*, reasoning, which implies that some truth was first unknown. Now, we mean that God has all pure perfections *formally* or

as such, and the mixed He possesses *eminently*, *i. e.*, in a better way, without any imperfections.

Proof. Whatever the necessary Being is, it is that necessarily; but God is the necessary Being; therefore, whatever He is, He is that necessarily. Therefore, if there is any limit to His perfection, that limit is necessary; *i. e.*, further perfection is excluded by the very nature of His physical essence; in other words, the entity or perfection of His being would exclude some further perfection. But no perfection excludes other perfection, or is incompatible with further perfection; there can be no contradiction between good and good, entity and entity, but only between good and not good, entity and non-entity, perfection and imperfection. Therefore no perfection can exclude any other perfection; hence no perfection is excluded either in kind or in degree; therefore God is infinitely perfect.

234. **Objections:** 1. Our finite intellect cannot know the nature of the infinite Being. *Answer.* We cannot know the nature of the infinite Being adequately, but we can know many things about it; for they are applications of first principles—*e. g.*, that there can be no effect without a cause, that no effect can be greater than the cause, that entity or good as such is not opposed to entity, but to non-entity, etc.

2. The Holy Scriptures warn man not to search into things too high for him: "He that is a searcher of majesty shall be overwhelmed by glory" (Proverbs xxv. 27). *Answer.* It is not too high, but most appropriate for man to know his Creator, that he may reverence Him as he ought: "For the invisible things of God from the creation of the world are clearly seen, being understood by the things that are made: His eternal power also and divinity; so that they

(the ungodly) are inexcusable" (Rom. i. 20). But we are warned not to criticise the ways of God when they surpass our understanding: it is unreasonable for creatures to require of the Creator that He shall render them an account of His government of the world.

3. We ought not to ascribe human perfections to God; else we make Him an anthropomorphic God. *Answer.* Since all creation is some representation of God's perfections, there must be an analogy between the perfections of creatures and the perfections of God; but there is only an analogy. Human perfections are not predicated of God univocally, but always with a difference; and thus God is not made an anthropomorphic or human God. Our view of God is true as far as it goes, but it does not do full justice to God; thus, we say that a picture is a true representation of a statue, though it is unlike the statue in certain respects.

4. It is better, with Agnostics, to call God the great Unknown than to represent Him inadequately. *Answer.* This plea is not even plausible, though it is one of the most specious pretexts of modern infidelity. Inadequate knowledge, acknowledged to be inadequate, is better than total ignorance of any great truth—it is true as far as it goes; but to call *Him* unknown of whom we know so much is a violation of truth, a negation of what we know. Besides, it is most unjust, since it deprives the Creator of the honor which is due to Him by His creatures; for who will worship the Unknown, even though it be spelled with a capital U? It is also most injurious to society; for it throws doubt upon the final accountability of men, and thus destroys the only adequate sanction of the natural law.

Article II. The Perfect Simplicity of God.

235. We have seen that all perfections belong to God; we must now prove that they are all really one, not distinct from one another except in our manner of conceiving them: this is meant by saying that God is perfectly simple. For **simplicity**, as explained in *Ontology* (No. 90), is the perfection which makes a being identical with all that is in it; while **composition**, the opposite of simplicity, implies a distinction of parts. Composition is *real* when the parts are distinct from one another in fact, in the compound object itself; it is *logical*, or mental, when the distinction is only between our concepts. Now, we do not pretend that there is no distinction between the various concepts which we form of God's perfections, that we do not trace logical distinctions in Him; in fact, we cannot help doing so, and our mental distinctions have a true foundation in the reality. For we cannot take in all the being of God at a glance; we learn His essence, as it were, piecemeal from what we observe in creatures, whose perfections must have some prototype in His own nature; therefore we affirm distinct attributes of God, and we have reasons to do so. But we are now to show that the perfections of God which correspond to our distinct concepts are not really distinct in Him; they are but the different aspects under which we view the same reality.

236. **Thesis III.** *God is absolutely simple.*

Proof. That being is absolutely simple which excludes every kind of real composition; now, such is God; therefore He is absolutely simple.

The minor may be proved: I. *In general.* Any real composition must consist of finite parts, else the parts would be equal to the whole; but no union of finite things can make

up an infinite being, as God is; therefore He does not consist of parts. II. *In particular.* God excludes all composition.

1. Of *physical parts:*
   (*a*) Of *integral* parts; for integral parts make up quantity, and in the infinite being they would have to make up infinite quantity; but an infinite quantity actually existing is absurd.
   (*b*) Of *substantial* parts, such as matter and form; for each part would be finite, and no union of finite things can make the infinite.
   (*c*) Of *accidental* parts; for nothing can be accidental in the necessary being.
2. Of *metaphysical parts*, viz.:
   (*a*) Of *essence and existence;* for existence is essential to the necessary being.
   (*b*) Of *substance and accident;* for the accident would be something finite and the substance something finite; and these two finite things would constitute an infinite being.
   (*c*) Of *power and act;* for the infinite Being has essentially all perfection, and therefore all action, since action is more perfect than mere power of action.
   (*d*) Of *essence and attributes;* for all its attributes are essential, are its physical essence.
   (*e*) Of *some attributes and other attributes;* for if these were really distinct from each other, they would be finite, and finite things would make up an infinite being.
   (*f*) Of *genus and species;* for the genus and the specific difference would be finite. Besides, God is not in any genus; nothing is univocally predicated of Him and of a creature. (No. 16.)

(*g*) Of *species and individual;* for God is essentially whatever He is, and therefore His very individuality is essential to Him.

237. Some important **corollaries** flow from this thesis: 1. That God is a substantial act, a *pure act* without potentiality or power as distinct from action or from the reception of any further perfection, one infinite act, embracing all the objects of His activity. 2. That matter, which is essentially potential, cannot be God nor part of God; and therefore that Pantheism, which makes all things God, is an absurdity. 3. That the nature of God is not divisible; and therefore that, once we learn by Revelation that there are **three really distinct Persons in God,** we know that they must have the same individual nature; nor can there be a real distinction between the nature of God and the Persons, but only between the Persons as such, so that the Father is not the Son, and yet He is the same being as the Son.

238. **Objections:** 1. Holy Writ attributes hands and feet to God, as also passions, all which supposes an organism. *Answer.* Holy Writ usually presents God to us in figurative language wisely adapted to our manner of understanding, viz., in connection with our imagination.

2. Pantheists argue that an infinite substance excludes all finite substances, and therefore whatever exists must be a part of God *Answer.* There is no contradiction between the existence of the infinite substance and that of finite substances; these are not to be conceived as bodies which naturally exclude one another from the place they occupy.

3. But if God has all entity, He contains all creatures, for these are entities. *Answer.* God contains all entity eminently, but not the formal entities that

constitute the creatures. It is proper to remark here that various modern theories are implicitly pantheistic, making the world the one necessary being. Now, **Pantheism** is not only metaphysically absurd, as proved in the first chapter of *Cosmology*, but it is also destructive of morality among men; for if we are God, or parts of God, we certainly can do no wrong, we are not responsible to a supreme Judge and Lord; each of us is fully justified in doing as he pleases. With such a doctrine there is an end to all moral obligation, and there would soon be an end to human society.

CHAPTER III.

THE QUIESCENT ATTRIBUTES OF GOD.

239. We have stated above (No. 231) that self-existence is generally held to be the **metaphysical essence** of God; by which we simply mean that when our mind, incapable of understanding the infinite being by one concept, forms partial concepts of His perfections and strives to put order in its knowledge, we designate self-existence as its essence, but only a quasi-essence—*i. e.*, as the note from which all the other perfections discerned in God flow, after the manner that attributes do from the essence of a created being. These perfections or **attributes** of God may, for convenience' sake, be classified under two heads—namely, His *quiescent* attributes, those that do not formally regard action, and His *operative* attributes, which formally regard action.

We are now to treat of the former class, and we shall consider in particular the unity, the immutability, the eternity, and the immensity of God.

240. **Thesis IV.** *There can be only one God.*

Proof 1. If there were more gods than one, they either could or could not will opposite effects; if they could not, they would not be free and independent, not infinite; if they could will such effects, they could not give efficacy to their contradictory wills, they could not be all-powerful. But a being that is not every way infinite is not God.

Proof 2. If there were more gods than one, there would be various infinite beings; but this cannot be. For, being

infinite, such gods would have all perfections, and therefore everything that the one had the other would also have; they would then not differ except numerically. But they could not differ numerically; for this would suppose that their individuality would be really distinct from their essence, since the essence is really separated in the second god from the individuality of the first. But we have seen that there is no real distinction between the essence of God and His individuality. Therefore there is only one God.

241. **Objections:** 1. The arguments just laid down would prove as well that there can be but one Person in God. *Answer.* They prove only this, that everything in God is one individual Being, and such are really the three divine Persons.

2. The consent of nations was at one time in favor of polytheism. *Answer.* Most nations considered the so-called gods as subjects of one supreme Being, the one only God.

3. One infinitely perfect God will not account for the evil that is in the world. *Answer.* The creature is the cause of the moral evil; and, as to physical evil, God can cause it; for He does not owe His creatures anything, and it is not unworthy of Himself to give them a finite happiness of mixed enjoyment and suffering, especially since men can turn their sufferings into merit. As for the sufferings of the brute animal, they are far less than we often imagine. (See *Dublin Review*, Jan., 1888, "The Ethics of Animal Suffering," Vaughan.)

4. But an infinitely perfect God could not create a being capable of doing moral evil. *Answer.* This we absolutely deny: in giving us a free will God gives us a very good thing, and He does so for a very good

purpose, that we may honor Him with it and benefit ourselves; if we abuse His gift, He knows how to draw good out of evil, exercising His mercy in pardoning and His justice in punishing.

242. Among the civilized nations the unity of God is now universally recognized. In ancient times, though the worship of many gods was a wide-spread error among the masses, it found little favor with the philosophers, except in the form of dualism, which supposed two necessary beings, the one all good and the other all evil. In the beginning of the Christian era the Gnostics borrowed that error from the Persians, and made it popular in several parts of Europe. Afterwards the Manichæans, and later on the Albigenses, adopted the same absurd theory. It was revived in the sixteenth century by the erratic Pierre Bayle, the author of the *Historical and Critical Dictionary*, but it is now universally abandoned. The only ground for the theory was the difficulty of reconciling the existence of one infinitely good God with the presence of evil in this world. They imagined, therefore, that evil proceeded from an evil being, which they supposed could not have been produced by a good cause, and therefore they considered it as self-existent. Bayle conjectured that the good and the bad principles had made a compact to blend their works with each other. It would be difficult to imagine a more unphilosophic error. For a being all evil would have no perfection, and therefore no entity at all; and a being that would be driven to make a compact with the evil principle would be either wicked or weak, certainly not the infinitely good God. This is one of the many examples which the history of philosophy affords, showing us how self-conceited theorizers will often refuse to accept some well-established truths owing to some apparent difficulties, and, rather than modestly acknowledge

the limitation of their intellects, build up systems full of wild conjectures and flat self-contradictions.

243 **Thesis V.** *God is absolutely immutable.*

Explanation. We maintain that there cannot be changes intrinsic to God; there may be extrinsic changes, changes in the relations between God and creatures, as when the world began to exist and thus God became its Creator, or when Lucifer fell and was thenceforth hated, while before he was loved by his Maker: in such cases all the intrinsic change is on the part of the creature.

Proof. An intrinsic change supposes the removal of a perfection or entity, or the addition of a perfection, or the exchange of one perfection for another. But nothing of the kind can occur in God; for, since all His perfections are necessary, He cannot lose them, and, having all, He can acquire no more, nor exchange one for another.

244. **Objections:** 1. God is free; therefore He can change His mind. *Answer.* He has all the perfection, but not the imperfections of free will; now, the power of changing one's mind implies an imperfection.

2. God is influenced to change His will by the prayers of His creatures. *Answer.* He knew from eternity all future prayers, and therefore He determined from eternity what He would do in consideration of those prayers. When we delay to determine a conclusion, it is either because we are without proper information, or because we do not know what is best, or because we are sluggish or timid; God has no reason to delay His choice.

3. If God cannot change, He cannot threaten and yet pardon. *Answer.* He determined from eternity to threaten conditionally, and execute His threat or pardon according to the circumstances which He foreknew.

Further difficulties on this point will be answered further on, in connection with the liberty of God (No. 256); others were considered when treating of human liberty (No. 199).

245. **Thesis VI.** *God is eternal.*

Proof. Eternity, as beautifully defined by the Christian philosopher Boëthius, is "the simultaneously full and perfect possession of a life that has neither beginning nor end"—*Interminabilis vitæ tota simul et perfecta possessio;* now, such possession belongs to God. For,

(*a*) Since God is a self-existent, and therefore a necessary being, His life is without beginning and without end; because He is immutable, He must possess His life simultaneously in all its fulness; and because He is infinitely perfect, He must possess it perfectly.

(*b*) Since God is absolutely simple, there is in Him no real distinction between power and act, nor between one act and another; He is, therefore, one pure and substantial act; therefore He possesses the fulness of His life, not as broken up into moments, but simultaneously; and because His existence is His very essence, His full enjoyment of life is without beginning and without end.

246. **Objections:** 1. All reality must be in God; but time is a reality; therefore it is in God. *Answer.* Every pure perfection or reality is in God formally; but time is not a pure, but a mixed reality, for time is the measure of successions in finite beings; as such it implies an imperfection or limit of existence which, of course, cannot be in God. Time is, however, eminently in God; for eternity contains all the perfection of time.

2. Eternity, as explained in the proof of this thesis, would seem to be full at each moment; but we

co-exist with some of those moments: therefore we co-exist with eternity. *Answer.* We co-exist with God, who is eternal, but not with the eternity of God. For we cannot say that eternity is full at each moment, but that it is not divisible into moments. Eternity may be said to co-exist with each moment, and yet each moment does not co-exist with all eternity.

247. **Thesis VII.** *God is omnipresent and without limit.*

Explanation. 1. The **omnipresence** or ubiquity of God means His presence in all existing things, and therefore in all real space; His **immensity** means His essential existence without limit of space, so that there is no real or possible space outside of Him. 2. Besides, the omnipresence of God, as implying a relation to creatures, cannot be predicated of Him unless creatures exist—it is a relative perfection; but His immensity is an absolute perfection of His being, and as such it had no beginning. 3. God's immensity should not be imagined as something extended; for whatever is extended has quantity and therefore cannot be infinite. But it is with the immensity of God in respect to space as it is with His eternity in respect to time: He is whole and entire wherever He is and whenever He is.

1st Part. God is omnipresent. Proof. All creatures exist for no other reason than that God gives them existence and keeps them in existence. But He cannot act where He is not present · for nothing can be a cause where it is not, since there it is nothing, and nothing cannot produce any effect. Therefore God is present in everything.

2d Part. God is unbounded. Proof 1. Else He would have limits of some kind, and therefore would not be truly infinite. *Proof* 2. He would not be all-powerful to create if He were confined to any space; but He is all-

powerful, therefore He is not confined to any space. The major proposition is evident; for if He were confined to any space, He could not create beyond that space, since a being cannot act where it is not; therefore He would not be all-powerful.

248. There are **three ways in which God is in a creature**: 1. By His *essence*, *i. e.*, by existing in that creature. 2. By His *power*, *i. e.*, by working in that creature, giving it existence and everything it has. 3. By His presence, knowing the creature and in some cases making Himself known to it. It is very different with creatures; thus, a king may be said to be throughout his kingdom by his power, to be present to his troops when he reviews them, but he is essentially or substantially confined to the narrow compass of his body.

CHAPTER IV.

THE OPERATIVE ATTRIBUTES OF GOD.

249. The **operative attributes** of God are those which imply action; they are His *knowledge*, His *will*, and His *power*.

Article I. The Knowledge of God.

250. Since God is absolutely simple, His knowledge, subjectively considered, cannot be made up of different ideas, but must be identical with the one substantial act, which constitutes His essence. Objectively considered, His knowledge may be distinguished according to three classes of objects, into which all things that are knowable may be divided: 1. His knowledge of **pure intelligence** embraces His own essence, as imitable in possible creatures. 2. His knowledge of **vision** comprises His own essence in itself and all that is ever actualized in creatures, whether past, present, or future. 3. His **conditional knowledge** regards all that any creature would do under any circumstances; it is styled *scientia media*, because it holds a middle position between the knowledge of actual and that of possible beings. For instance, the assertion "If Cæsar had not been slain, he would have assumed the royal purple" is either true or false; we do not know whether it is the one or the other; but we say about all such propositions, "God alone knows." This is what we mean by His conditional knowledge.

251. **Thesis VIII.** *God knows all things possible and all*

things actual, whether past, present, or future; and even all that any free creature would do, in any given case.

Proof 1. *Direct.* Since God is infinitely perfect, He must know all truth; but there is truth in any judgment that may be formed on any of these matters or in the contradictory of that judgment; therefore God must know it. For instance, the assertion "If Cæsar had not been slain, he would have assumed the royal purple" is true, or its contradictory is true; now, all truth must be known by an infinitely perfect being.

Proof 2. *Indirect.* If God did not know all these things, He could not govern His creatures with infallible wisdom; He might be disappointed, taken unawares by an unexpected free act of man or angel; He would thus not be infinite in wisdom.

252. **Objections:** 1. If God knows what any person's will would choose to do in a given case, it must be because He knows the nature of that will so intimately as to see what that will must choose in a given case; therefore that will *must* make that choice, owing to its very nature; therefore it is not free. *Answer.* We grant that a will which *must* act in a certain fixed way is not really free; but that is not the way with our will, nor with God's conditional knowledge of our choice in a given case. He knows what we would choose, not because we *must* so choose, but only because we *would* so choose; for that we would, is an objective truth and a knowable truth.

2. That which has no being cannot be an object of knowledge, but conditional acts never happening have no being. *Answer.* They have no physical, but they have logical being; for judgments can be formed about them, and those judgments have truth or falsity.

3. What God knows will happen must necessarily happen, and therefore it cannot be a free act. *Answer.* The word 'necessarily' has two meanings: it will necessarily, *i. e.*, infallibly, happen, for what is future is infallibly future, just as what is past is infallibly past; but it will not happen necessarily, *i. e.*, without freedom; just as our past acts were free when we did them: knowledge does not destroy liberty.
4. The explanation given makes God's knowledge of what we would do dependent on our choice; but God cannot in any way depend on any creature. *Answer.* God's knowledge, subjectively considered, is independent of all creatures, for He does not receive His power of knowing from creatures; but, objectively considered, knowledge necessarily supposes the object known, and it argues no imperfection in God that His knowledge of our free acts supposes our free acts and is consequent on our acts.

253. The attribute of **wisdom** may, in one sense of the word, be ranked with that of Divine knowledge; for wisdom often means the knowledge of things in their highest causes. Thus considered, all the knowledge of God is properly denominated wisdom; for He knows all things as they stand related to their highest causes. In another and more usual sense, as St. Thomas fully explains (*Contra Gentes*, c. i.), wisdom comprises both knowledge and action, and means the proper direction of things to their highest ends. As such, God's wisdom is manifested by the effects of His providence, of which we shall treat in connection with His power. (No. 266.)

Article II. The Will of God.

254. **The will of God** is not, like ours, a power passing occasionally into acts, but it is one act loving and willing

all that is necessary, viz., His own essence, and determining freely what contingent things shall be, and what others shall not be, allowing meanwhile for the free choice of His intelligent creatures.

God's love of creatures is nothing else than His will to bestow happiness. This will is often conditional, His actual conferring of benefits being made dependent on the free acceptance of intelligent creatures, whom He earnestly desires to make happy. His will viewed as antecedent to free acceptance is called His **antecedent will**; viewed as taking into account the acceptance or refusal of free creatures, it is styled His **consequent will.** The latter is always efficacious; but the antecedent will may remain inefficacious, because the creature refuses to comply with the required conditions. We shall consider the will of God under three aspects: as *free*, as *holy*, and as *good.*

255. I. **Freedom, or liberty,** is the power of choosing between two or more things: (*a*) The power of choosing whether a thing shall be or not be is called **liberty of contradiction.** (*b*) The power of choice between two contraries, such as good and evil, is **liberty of contrariety**; a defect is implied in the power of choosing evil, and, of course, it is not in God. (*c*) The power of choice between one thing and another not contradictory is the **liberty of specification**; we attribute to God liberty in all its perfection.

256. **Thesis IX.** *God is free in all His external acts.*

Explanation. By external acts we mean all His acts in regard to creatures; and we maintain that God from eternity, by a single act of His will, determines affirmatively or negatively all possible questions concerning all possible creatures, so, however, as not to interfere with the free acts of His free creatures. His act of determining is not free as to its entity, but as to its term; *i. e.*, He must determine every question,

but He can determine it as He pleases, compatibly with His infinite perfections.

Proof 1. A well-ordered will is in conformity with a perfect intellect; now, a perfect intellect directs that what is necessary shall be willed absolutely; what is unnecessary, freely. But all created things are unnecessary, therefore God wills them freely.

Proof 2. If God were necessitated to will anything outside of Himself, this necessity would arise from Himself or from another being; but it could arise from neither. 1. Not from another; for all other beings are contingent, and therefore cannot necessitate their own existence. 2. Not from Himself; for this would suppose that there is something wanting to Him, some want to be supplied by creating, which could not be supplied by not creating; but this cannot be, else He would not be infinitely perfect, and His perfection would require a finite complement in order to become infinite.

257. **Objections**: 1. God cannot do wrong; therefore He is not free. *Answer.* The power of doing wrong implies a defect of the intellect or the will; it is not a perfection of liberty.

2. Liberty supposes potentiality, *i. e.*, something that may be or not be; but there is no potentiality in God. *Answer.* It supposes potentiality on the part of the term or object willed, on the part of the creature, not on the part of the Creator.

3. A free act is contingent, for it is not necessary; but God's acts are necessary. *Answer.* God's act is necessary; the contingency is in the object or term.

4. If God were free, He could change His decrees; but He cannot. *Answer.* God can do nothing inconsistent with any of His perfections; now, a change of

design would suppose that He has learned new motives for deciding, or that He changed His mind without reason. Besides, though the matter is far above our grasp to explain fully, there is but one act in God; hence no change is possible, and still that act is free with regard to creatures.

258. **Holiness,** or **sanctity,** means the love of what is right or morally good, and the hatred of what is wrong or morally evil; viewed as an attribute of God, it may be defined, the immutable will of God to act in conformity with His perfection, in a manner worthy of Himself. Perfect sanctity is evidently essential to the infinitely perfect Being.

259. **Thesis X.** *God is infinitely good.*

Proof. Goodness has various meanings, in each of which it is infinite in God. 1. Goodness, as a *transcendental*, is being, viewed as desirable; in this sense it is clear that God is infinitely good, inasmuch as He is infinite being, and therefore an infinite object of desire. 2. Goodness may be taken in the moral sense of conformity to the law of reason; it is then synonymous with *sanctity;* it must be perfect in the infinitely perfect Being. 3. Goodness is often taken in a relative sense, and signifies an earnest will to make others happy; it is then often called *bounty* or *beneficence.* In this sense it is infinite as an attribute of God; for it has been proved *a priori* that the self-existent Being is infinitely perfect. His bounty, however, is not infinite in its manifestations or effects, for all the works of God must be finite in finite creatures. Therefore we cannot prove *a posteriori* that God is infinitely bountiful.

260. **Objections:** 1. If God possessed infinite moral goodness, He would manifest His hatred of sin by not allowing sin to exist. *Answer.* God, indeed, detests sin infinitely and forbids it absolutely; but there are

two ways in which hatred of sin can manifest itself, viz., by preventing its existence, and, without preventing it, by repairing the evil with full compensation. God often chooses the latter way; He punishes some of the guilty with endless punishment, and He has Himself made an atonement of infinite merit for the sins of men. (Nos. 115, 118.) (See on this matter "A Sceptical Difficulty against Creation," by Rev. R. F. Clarke, S.J., *American Catholic Quarterly Review*, April, 1887.)

2. If God were infinitely bountiful, He would make all His creatures happy. *Answer.* He would seriously wish all to be happy, we grant; He would make them happy against their will, we deny. The manifestation of His goodness must have a limit, which it is for Him to determine, or to place, if he so chooses, in the determination of man's free will.

Article III. The Power of God.

261. **Thesis XI.** *God is omnipotent.*

Proof. Omnipotence is infinite power; now, power is a perfection, something which it is better to have than not to have, and the self-existent Being has all perfections; therefore He is omnipotent.

262. **Objections:** 1. God cannot create all possible things together, because they would constitute an infinite number; therefore He cannot do all things. *Answer.* He can do all things; but anything self-contradictory is not truly a thing. The fact that all possible things cannot be actualized together is not owing to any limit in God's power, but to a necessary limit in all finite things; for these cannot co-exist without making a number,

and an infinite number of things actually existing is absurd.

2. God cannot create a square circle, nor an infinitely perfect being. *Answer.* Both these involve contradictions; for square denies the roundness essential to a circle, and a creature, by the very fact that it is a creature, cannot be infinitely perfect.

263. **Thesis XII.** *The preservation of created beings requires at every moment the active influence of God's power and will.*

Explanation. We do not mean that God need protect every creature against other creatures or against the action of the natural laws; but that all and any created being would cease to exist, if God ceased for a moment actually to will its existence, just as the figure of a body of water would at once cease to exist if the vessel holding it were destroyed.

Proof. The present existence of a contingent being cannot, by itself, be the cause of its future existence; for the cause must contain the effect, and the present existence does not contain the future existence. Therefore another cause must exist for the permanence of that being. If this other cause be itself unnecessary or contingent, it, too, will be unable to exist and act just then, except in virtue of another cause giving it then and there existence and power of action. And thus no contingent being could continue to exist from one moment to another, except in virtue of an influence not itself contingent nor dependent, which is nothing else than the power and will of God. This may be illustrated by reflecting that the strength of a manufactured article depends on the strength, or power of permanence, of the material of which it is made. If no material were used, there could be no power of permanence, except as far as the maker continued to give it existence; now, all creation is not made out of a pre-existing material; therefore its

preservation depends at any moment on the active influence of the Creator.

264. By a similar reasoning it may be proved that God not only keeps all things in existence, but that He actually **concurs with every act** of every creature. For creatures depend on God totally—that is, according to all their entity; but there is in every act an entity which is beyond the mere power of acting; therefore the act also, and not merely the power, must depend on God.

265. **God's concurrence with a free act** of a creature does not in the least interfere with its liberty; for by the very fact that He makes the being free He concurs with it in acting one way or another, as the free will chooses. The free act is man's and it is God's, but with a difference: as a boat is supported by the water, propelled and directed truly by the efforts of man, but by means of the water; so human actions proceed truly from man, but with the concurrence of God.

266. The **Providence** of God is the wisdom whereby He directs things to their proper ends.

Thesis XIII. *Every event in the world is directed by Divine Providence.*

Proof 1. This is a dictate of common sense; for all men look up to God as the supreme Controller of every one's destiny, and all nations, even while believing to some extent in fate, as some did, still prayed to God as the Dispenser of good and evil.

Proof 2. It is the part of wisdom to direct all things to their proper ends by proper means; but God is infinitely wise, since He is infinitely perfect; therefore He directs all things to proper ends by proper means. Now, He could not do so unless He directed every event in the world; therefore He directs every event in the world.

267. **Objections:** 1. All men agree that some things

happen by accident, but accident means the absence of design. *Answer.* All agree that things happen which are not the result of design on the part of men; but they do not deny that everything which happens is willed or permitted by Almighty God. If God specially and directly intends anything with regard to any creature, it is said to proceed from a special providence of God; else it is attributed to the general providence of God, who sees and wills distinctly all the consequences of the natural laws.

2. At least the events proceeding from human design are not directed by the providence of God, *e. g.*, the wicked plots of murderers. *Answer.* The physical actions of even the worst men and the effects of such actions cannot exist except with the permissive will and the actual concurrence of God; He can and does direct even these to proper ends not intended by the evil-doers, *e. g.*, that He may increase the merit of His martyrs and of the good in general. Therefore Holy Writ says: "We know that to them that love God all things work together unto good" (Rom. viii. 28).
3. It were unworthy of God to mind little things. *Answer.* No more than it is unworthy of a good painter to mind every detail of his painting. Besides, the most perfect creature is as nothing compared to God, and nothing is little when viewed as directed by Him to a high purpose.
4. If God rules all events, men need and can do nothing. *Answer.* This were true if God ruled all events without regard to the actions of men; but not if, as is the case, He allows free causes to act freely, knowing, meanwhile, how to draw ultimate good from present evil.

5. A wise Providence would punish crime and reward virtue; but this is not always done in this world. *Answer.* It only follows that it will be done in the next world, where God has an eternity to manifest His goodness and His justice.
6. If there were a Providence, there would not be so much misery and so much inequality among men. *Answer.* Much of the evils of life comes from the vices of men, which God need not hinder for the present, but which will be atoned for in due time. Often sufferings and inequalities are part of His grand design of sanctifying souls. Besides, there is no reason why God should treat all His creatures alike; on the contrary, the poet has truly said:

> "Order is heaven's first law, and, this confessed,
> One is and must be greater than the rest,
> More rich, more wise;
> This who denies,
> Denies all common sense."

THE END.

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